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Ship and Boatbuilding.—A. M. Clark (com.), F. E. Todd, H. P. Scott and T. Donaldson, W. L. Gray, W. R. Lake (com.), L. H. Gullachson and W. Brydon, R. H. Tweddell.

Ships' Boats (lowering, &c.)—W. Richardson.

Ships (raising).—R. Punshon.

Ships' Cargoes (Loading, &c.)—G. Allix.

Shot, Shell, Bullets, Cartridges, Percussion Caps, &c.—S. Nordenfelt.

Show Cases, &c.—J. Kershaw, H. J. Haddan.

Sifting, Sorting, and Separating.—A. W. L. Reddie (com.), W. R. Lake (com.).

Sign Plates, &c.—A. McCaw, J. Stevenson and J. P. Orr, J. Edwards, T. L. Switzer.

Signals, Alarms, Communicating Apparatus, Conveying Sounds.—H. H. Lake (com.), W. Morgan-Brown (com.), H. J. Allison (com.), W. R. Sykes, W. P Thompson (com), W. T. C. Pratt.

Smoke (Preventing, &c.)—J. Gurney.

Soap.—W. Smith.

Sounds (reproducing, &c.)—W. Clark (com.), A. C. Engert.

Spades, &c.—G. Prior.

Spinning and Preparing for Spinning.—J. Camm, J. C. Mewburn (com.), J. H. Johnson (com.), J. H. Skinner, S. Tweedale, W. P. Thompson (com.), J. Clough, J. Robinson, G. and E. Ashworth, L. Wilson, W. Sumner, J. C. Fell.

Springs.—R. L. Barker, W. Cowell and W. W. Chapman.

Stables, &c.—H. J. Haddan (com.).

Stamps (revenue), &c.—J. J. Sachs.

Starch, &c.—W. C. Locke.

Stays.—C. W. Allen.

Steam and other Boilers, Cleaning and Preventing Incrustation of Boilers, Water Feeding Apparatus for Boilers.—C. Pieper (com.), P. Sampson, A. Dervaux, A. M. Clark (com.), W. Gray. J. and J. Hopkinson, T. Hudson, J. Windle, A. K. Irvine, E. A. Bourry, J. G. Cameron, G. Sinclair.

Steam Engines (Stationary, Locomotive, and Marine).—C. P. Deane, H. B. Young, H. J. Haddan (com.), R. Duncan, J. A. and J. Hopkinson, B. Fowler, R. Burton and R. H. Shaw.

Stone, &c.—C. Moreing, P. Jensen (com.).

Teaching, &c.—M. T. Foote, H. J. Allison (com.).

Telegraphs; Telegraph Printing Apparatus.—J. R. Edwards, S. Russell, R. and M. Theiler, R. C. Anderson, J. H. Johnson (com.), G. Wells and A. Gilbert.

Tents, &c.—C. A. James.

Tilling and Cultivating, &c.—A. M. Clarke (com.), E. Edmonds (com.), E. J. Lakeman, B. Fowler, R. Burton and R. H. Shaw.

Tobacco and Snuff, Cigars, Cigar-Holders, Pipe and Cigar-lighters, Smoking Pipes, Tobacco Pouches, &c.—F. W. Jennes and J. Schopper.

Tramways and Tramway Carriages, Tramway, Locomotives.—J. W. Dyson, J. Gowans, F. G. M. Stonic, G. Urie, H. Sharp, J. E. Morris.

Traps for Drains, &c.—F. W. Ann, S. S. Hellyer, A. T. Angell, M. Wilson, T. Jewell.

Trimmings, &c.—L. Deschamps.

Umbrellas, Parasols, &c.—W. Holland and R. Budd, S. Staight, B. Hunt (com.), J. T. and B. Lilley.

Upholstery.—W. R. Lake (com.), S. Ullmann (com.), S. Bowden (com.).

Urinals.—T. Jewell.

Valves, Taps, Stop Cocks, Plugs; Regulating the Flow and Pressure of Fluids.—C. Buckland, C. T. Mathew, F. Wirth (com.), J. H. Johnson (com.), T. G. Messenger, A. M. Clark (com.), T. B. Plumtree, W. B. Dewhirst and G. Barker, W. Sargent, T. P. and E. J. Preston and J. S. Prestige, W. R. Lake (com.), T. B. Goslin and J. J. Brown, G. Sinclair, T. Jewell, B. Walker and J. F. A. Pflamm.

Varnishes, &c.—W. R. Lake (com.).

Velocipedes, Bicycles, &c.—E. C. F. Otto, F. W. Jones, W. H. Monks, J. Hall.

Ventilation: Supplying and Purifying Air for Buildings, Mines, Ships, Carriages, &c.—L. J. Gilmore and W. R. Clark, F. Travis, W. Hickey and S. Barnett, H. Shiels, J. Howorth, A. Mill, T. Jewell, W. Cunningham.

Walking Sticks.—P. Jacquelin.

Washing, Cleansing, and Wringing Fabrics, Yarns, and Materials.—P. Mass and E. Doumenark, C. Phipps and E. Blackshaw.

Water-Closets, &c.—T. G. Messenger, W. Sargent, C. E. Monkhouse, W. R. Lake (com.).

Weaving, Braiding, Plaiting, Preparing for Weaving.—J. H. Johnson (com.), P. Evans and H. King, J. Clayton and T. Richmond, S. Hargreaves, H. H. Lake (com.), E. R. Dutton (com.), R. Moss, H. J. Haddan (com.).

*** *The above List is prepared from the Patent Records by Mr. T. Morgan, Secretary of the Inventors' Patentright Association, Limited.*

GLUCOSE MANUFACTURE.

There appears to be quite a furore in the West in connection with the manufacture of glucose from corn. A large number of factories are being set up; one at Chicago, it is said, will have a capacity of 20,000 bushels a day. A bushel of corn produces 30 pounds of glucose (grape sugar), or 3 gallons of syrup. The sugar costs 2 cents. a pound, the corn selling at 40 cents. a bushel.

FEATHER PLUSH.

For some time past the ingenuity of several manufacturers has alighted upon the idea of utilising feathers as a material for weaving fabrics in various ways. We thus saw recently two samples of feather cloth which had come from France, and which consisted, apparently, of the down of feathers interwoven with fine woollen warp, in one case throwing the feathers to one surface, and in the other laying them upon both sides; the latter, especially, was a very interesting and exceedingly light cloth, which we understand is used in France for chest protectors, and is for that purpose more agreeable, though perhaps not so durable, as flannel or felt.

From a foreign patent we see that one manufacturer has protected a machine by means of which he produces a cloth or felt, in which he mixes finely broken feathers with wool, and then cards and felts them together. The machine he uses for the purpose is a combination of the opener and scutcher as used in cotton mills, and the fur formers employed in hat works. The feathers, which may be of any cheap kind, are placed upon a feed table, whence they pass under a drum set laterally with steel knives, which break the feathers; from this drum they pass between three small rollers and a superposed fluted and chased iron roller with a to-and-fro motion endways, as well as a revolving motion, and by which the reduced feathers are ground quite small, and, falling upon a travelling apron, pass on to a spiked drum running in a cage, whose office is to reduce any pieces which have escaped the action of the rollers. The pounded feathers fall to the bottom of the machine, whence a fan sends them into a proper receptacle, where the feathers are mixed at once with wool. They may be blown direct upon the card table of a carding engine, which, in that case, must have a cover as is usual in carding cotton.

The mixture of feathers and wool can, of course, be made in any proportion. The inventor states that he has obtained the best results by felting the cloth; the laps made by the carding engines are jointed by friction under the influence of steam, then milled, dried, and subjected to the action of steam at a high temperature in a steam chamber, which latter action is said to thoroughly amalgamate the feathers and the wool.—*Textile Manufacturer.*

THE NEW YORK EXHIBITION OF 1883.

A Bill to provide for celebrating the one hundredth anniversary of the treaty of peace and the recognition of American independence by holding an International Exhibition of arts, manufactures, &c., in New York, in 1883, passed the Senate March 31. It incorporates the United States International Exhibition, composed of well-known New York gentlemen, whose official functions are to continue until the close of the Exhibition. It will be their duty to fix the date of the Exhibition, make the needed preparations for it on a site within the corporate limits of the city of New York, and to superintend the Exhibition during its progress. The Bill provides further that the corporation shall cease to exist on or before January 1, 1885. Congress may at any time alter or repeal the Act, and the United States are not to be liable for any of the acts or representations of the promoters of the enterprise. Not less than 1,000,000 dols. must be subscribed, and not less than 10 per centum thereof must be paid in before the corporation may do any corporate act other than organise, and no part of the capital, stock, or assets is to be withdrawn, refunded, or divided among the stockholders until all the debts are fully discharged.

Reviews.

KINGZETT'S NATURE'S HYGIENE.

"Nature's Hygiene: A Series of Essays on Popular Scientific Subjects, with Special reference to the Chemistry and Hygiene of the Eucalyptus and the Pine," By C. T. KINGZETT, F.C.S., &c. London: Bailliere, Tindall & Cox, King William Street, Strand, Paris, and Madrid. 1880.

MR. KINGZETT is now so well known in connexion with sanitary chemistry, that every one will be in expectation of something valuable when there comes to hand a book on that subject of which he is the author. The keynote to the contents of this work is given in his prefatory remarks, viz.:—

Of the many scientific subjects which, during recent years, have strongly arrested the attention of the public, few have excited more interest than that which has been manifested, from time to time, regarding the reputed sanitary properties of the eucalyptus tree. But while this interest extended even to several European and other governments, and although the hygienic value of the eucalyptus is based upon an abundant and increasing amount of evidence, yet no satisfactory explanation of this influence has ever been presented to the public.

During some years I have spent much time in the study of what are known to chemists as processes of slow oxidation, and have communicated the results of my researches to various scientific societies. These investigations, conducted, so to say, in the laboratory of Nature, furnished a full and sufficient explanation of the sanitary properties of the eucalyptus tree, and they also proved that the pine tree exhibits characters of the same important order.

In bringing this work, therefore, before the public, I am really endeavouring to place before them a scientific research in a popular manner. In so doing, however, I have not merely described my own experiments, but have also given particulars of those of all others who have worked upon the subject, and have incorporated the results in a number of chapters, which deal with a variety of questions more or less intimately concerned with Nature's Hygiene.

Each chapter will be found to form a complete essay in itself, and thus the book combines the features of a continuous study of some processes of Nature's chemistry and hygiene, and of a series of articles on scientific subjects.

Wherever an educated public is to be found, there must also exist a demand for popular scientific literature; and it is towards feeding such a demand that I have ventured to contribute this work, trusting it may not be received altogether without favour.

The work is divided into nine chapters. The first chapter has reference to the discovery of oxygen, water, ozone, and peroxide of hydrogen; their chemical relations and simple properties. The second chapter relates to the occurrence of oxygen, ozone, and peroxide of hydrogen in nature; the processes by which they are produced, and their further properties, particularly those relating to the phenomena of respiration and oxidation. The third chapter is occupied with studies of the processes of chemical oxidation, slow-combustion (decay or eremacausis), and putrefaction; their connection with the purity of the atmosphere, and their general sanitary bearings. The fourth chapter has reference to infectants and contagious disorders; the liability to contagion; embracing also a description of the germ and other theories of infectious disease, and the connection of epidemics with the process of putrefaction and other insanitary conditions. The fifth chapter treats of antiseptics and disinfectants considered as agents intended to arrest and prevent the spread of epidemics; their properties and modes of action. The sixth chapter has reference to malarial fever; its distribution and cause, together with a full descriptive and historical account of the alleged anti-malarial properties of the genus *Eucalyptus*, as observed in various countries. The seventh chapter contains a description of the essential oils and perfumes as natural products, their atmospheric oxidation in nature, the products which are thus formed, and the artificial imitation of the process; with special reference to the oils of eucalyptus and turpentine. A study of the antiseptic and disinfecting properties of those natural products which are formed in the atmosphere by the oxidation of essential oils occupies the eighth chapter; and the geographical distribution of eucalyptus and pine forests; the explanation of their hygienic powers as gathered from previous studies, and the determination of their extent and influence in nature, are dealt with in the ninth and concluding chapter.

It would be difficult to point out any one portion of this work as more interesting or instructive than another; therefore we refrain from quotation, contenting ourselves by recommending the work as one that ought to be read by everybody interested in hygiene, and one may say that this will include all the world.

"Annals of Chemical Medicine." By J. L. W. THUDICHUM, M.D. London: Longmans, Green & Co.

THIS is the first volume of a new periodical issue, and though it has little of chemistry in the absolute sense, it is full of such chemistry as falls within the boundary line between that science and physiology. The volume contains a large amount of interesting biographical information, amongst which will be found some curious anecdotes of Meyer's life, which seem to be new.

Infection and contagion are carefully and completele treated. The author summarises the views of others so justly that he cannot be considered to give undue prominence to his own.

The chapters on the organic acids of the brain, and on the chemical decomposition of the bile, are of high interest.

"Blowpipe Analysis." By J. LANDAUER. Translated by J. Taylor and W. E. Kay, 1879. London: Macmillan & Co.

THIS is a work worthy of hearty commendation, and will, we doubt not, be appreciated by students. The first chapter refers to "apparatus and reagents" required, followed by one on the "Operations of Blowpipe Analysis," giving the reactions on the "Aluminium Plate"—Ross's—"Bunsen's Flame Reactions," &c. Chapters three and four relate to the reactions of the elements in combination, and the systematic examination for them. A series of tables, very simply arranged, are given at the end of the work. A coloured diagram of the spectra of the elements prefaces the work.

"Electro-plating: a Practical Handbook, including the Practice of Electro-typing." By J. W. URQUHART, C.E. Crosby Lockwood & Co.

This work provides working directions in all respects applicable to the practice of the plating shop and the wants of amateurs. Scratch-brushes, batteries, dynamo-electric machines, electro-type, including steel-facing and the rapid process employed for illustrated newspapers, deposition of silver, silvered specula, nickel-plating, and electro-gilding, are among the subjects treated. The book is not overloaded with details, and is eminently readable. Though there is little of theory, yet its science is sound so far as it goes. Indeed, the work is worthy of all praise.

RONALDS' COLLECTION OF WORKS ON ELECTRICITY.

"Catalogue of Books and Papers relating to Electricity, Magnetism, the Electric Telegraph, &c., including the Ronalds' Library." Compiled by SIR FRANCIS RONALDS, F.R.S., with a Biographical Memoir. Edited by Alfred J. Frost, Acting Librarian of the Society of Telegraph Engineers, and Member of the Library Association of the United Kingdom. London: E. &. F. N. Spon, 46, Charing Cross. New York: 446, Broome Street, 1880.

THIS catalogue is published under the conditions of the trust deed of a library formed by the late Sir Francis Ronalds, and which is now in the possession of the Society of Telegraph Engineers.

It contains not only a record of the works in the library, but also of all other works on the subject of electricity, &c., which came to the notice of Ronalds.

It has been published by the Society at great cost, and no expense has been spared to render it as accurate as the nature of the work would admit.

The work has a considerable interest from having been the production of a man who is recognised as the "Father of English Telegraphs," he having invented and erected the earliest of all telegraphs, nearly 30 years before the electric telegraph became popular in this country. Ronalds was knighted in 1870, two or three years before his death.

The importance of this work cannot be over rated, being the first of its kind, and the Council of the Society state that they are very desirous that it should be as widely known as possible.

Corbett and Peele, the agricultural engineers of Shrewsbury, have issued an illustrated catalogue, which deserves our commendatory notice, especially when it is remembered that this firm was highly successful at the Sydney Exhibition.

"The Doom of the Great City" is a curious work, a review of which we are compelled to postpone.

INJURIOUS EFFECTS FROM VULCANITE PLATES.

SAMUEL SEXTON, M.D., in an article published in the *American Journal of the Medical Sciences*, for January, 1880, states that vulcanite plates produce diseases that are more frequently the source of reflex aural disease than any others worn. They have been in use for over twenty years, and their adoption is very general. The constituents of this are caoutchouc, the sulphur required in the vulcanising process, and vermilion or the sulphide of mercury, used for the colour it imparts. The quantity of the latter ingredient is believed to be equal in weight to both the other substances mentioned; accurate knowledge, however, is withheld by the manufacturers.

The gradual disintegration of these plates, as they are worn in the mouth, liberates a salt of mercury whose poisonous effects are well known. But besides yielding a poison, they are otherwise injurious to health. Inquiries from dentists elicit the fact that at least one-third of all those who attempt to wear them experience great irritation of the mouth, an irritation that is frequently accompanied by hypersecretion of the buccal fluid. The sufferer usually lays aside the plate until informed of the necessity of becoming accustomed to its presence by uninterrupted use. Vulcanite is a non-conductor of heat, and the effect of its contact with the highly sensitive tissues of the mouth is to produce hyperæmia and inflammation. Another source of injury is the very close contact of these plates, which is maintained by atmospheric pressure, and may favour the absorption of their substance.

INVENTORS' INSTITUTE.

The Annual General Meeting of the Inventors' Institute took place at 4, St. Martin's Place, Trafalgar Square, on Thursday, 20th May, at 4.15 p.m. F. H. Varley, Esq., C.E., the Chairman of the Executive Council, was voted to the Chair, and took the same accordingly. Those present were:—J. P. Cutts, Esq., J. Greenfield, Esq., T. Blanchett, Esq., T. Morgan, Esq., Messrs. Hillier and F. W. Campin (Secretary) and other well known members of the Institute.

The Minutes of the last Annual General Meeting having been read by the Secretary were passed as correctly entered.

The Chairman then requested the Secretary, Mr. F. W. Campin, to read the Report of the Executive Council, which was as follows:—

Eighteenth Annual Report.

The Executive Council, in presenting this the 18th Annual Report, do so under unprecedented circumstances, for very recently a general election of members of Parliament has taken place, and Her Majesty has appointed a new Government (to supersede the former one under the premiership of Lord Beaconsfield), so that matters governmental and political have up to the present time not progressed so far as to enable the Executive Council to state what course the new Government will adopt with regard to the Patent Laws, though encouragement for hope of a good settlement of this question is small indeed, looking at the fact that Lord Selborne, the Lord Chancellor, is a declared opponent of any patent law whatever, and Lord Granville, another member of the ministry, holds similar opinions on the subject. Hence it would be almost hoping against hope to expect that during the present Session of Parliament anything will be done to benefit the inventor's cause quite irrespective of the political situation which keeps matters of this sort in the background.

But though this view of the matter is without doubt perfectly sound, yet it is right that inventors should be informed that Mr. Anderson, M.P. for Glasgow, appears to be willing to again bring forward a Bill for amending the Patent Laws, which proposes to enlarge the term of Letters Patent from 14 to 21 years, requires the appointment of permanent Commissioners, and reduces the cost to a considerable extent, that is to say, the existing stamp duties are, we understand, to be replaced by the following, viz., stamp on petition for Letters Patent £1 5s.. and on certificate of notice to proceed £1 5s., &c.

This Bill, though it aims only at an instalment of reform, viz., reduction of cost (the requirement of permanent commissioners and extension of time being the only clauses outside of cost), and does not in any way reverse the present system, either in regard to granting of Patents or in reference to rendering the grant more secure and protective, is nevertheless, a step in the right direction. It has been estimated as such by the Executive Council, and looking at the difficulty of obtaining any common agreement on the details of a good Patent Law, many persons whose opinions are worth consideration have suggested that such a Bill might be an acceptable settlement of the Patent question for the present time, if the term of provisional protection were prolonged to one year, as in the late Attorney-General's Bill, and its cost reduced to 10s.

Of course one cannot speak with certainty even with regard to Mr. Anderson's efforts, as for the present everything Parliamentary is in a nebulous state, but it may with some confidence be suggested that if the Inventors' Institute should think it desirable to solicit Mr. Anderson to bring in this Bill, it seems very probable he would comply with their solicitation, especially as the working men's organisations seem to favor the introduction of such a Bill.

With regard to the Bill brought in by the late Government, substantially a reiteration of other Bills brought in by them and dropped, we have only to state that it shared the fate of its predecessors, and was not proceeded with.

Keeping still to the Patent Law question, we have to state that we understand from our worthy vice-president, Admiral Selwyn, that the Paris International Congress still continues its labours; and hopes of Patent Law reform from the action being taken by this Congress, are by no means small.

Although the Patent Laws have absorbed the attention of the Executive Council to a considerable extent, the other objects for which the Institute was established have not been neglected, but owing to the very inclement weather that has prevailed during the last session, it has been almost impossible to get up good evening meetings; still several papers of importance have been read at well attended meetings, and discussions had thereon. Amongst these we may mention papers on "Miners' Safety Lamps," by Mr. Furdy; "On Brilliancy in Lighting," by J. Cadett, Esq.; "On Electric Lighting," by F. W. Campin, Esq.; and "On Improvements in compound Engines," by Mr. Turnbull, when Mr. T. Morgan also explained Worthington's "Grapharc" and other inventions.

The Executive Council propose that the thanks of the Institute in General Meeting assembled be given to all the readers of the papers above-mentioned, as also to the inventors concerned therein.

The Patent Law question has been discussed at several meetings, conferences being held on the subject, notably on 5th June, 1879, when Messrs. H. Broadhurst (now M.P. for Stoke), G. Howell, S. Brighty, and others attended as representative working men.

As regards the finances, the Executive Council have to state that a balance-sheet has been prepared, and audited by J. P. Cutts, Esq., auditor, and is submitted to the present meeting.

In conclusion the Executive Council may observe that they have now adverted to every matter proper to be brought before the general body of the members, and it therefore only remains to state that according to the rules, one-third of the Executive Council have to-day to retire from office, but are eligible for re-election. Those who now retire in accordance with seniority are Messrs. T. Blanchett, S. Calley, Captain Fairholme, R.N., and T. Paterson. With regard to Captain Fairholme it is to be remarked that he has resigned the membership of the Institute, and is therefore ineligible for a seat on the Council.

The Report having been read, the Chairman moved, and Mr. Morgan seconded, and it was resolved unanimously, that it be received and adopted and annexed to the Minutes of the Meeting.

The Acting Treasurer, Mr. G. A. Stretton, then produced and read the balance-sheet—No. 1, receipts and disbursements; No. 2, assets and liabilities. Audited by J. P. Cutts, Esq., the auditor of the Institute; and, on the motion of the Chairman, seconded by Mr. Greenfield, the balance-sheet was passed and adopted unanimously.

The Secretary then adverted to the fact that at the annual general meeting immediately preceding the last one the Presidentship and Vice-Presidentship, as per published lists, were rendered permanent; hence no re-election of those officers was necessary; but it was open to any member to propose any addition to the list, and he mentioned that there were two gentlemen, Mr. F. H. Varley, who had for years past held the position of Chairman of the Executive Council, the esteemed member now occupying the chair, also Dr. J. M'Grigor Croft, who might well be considered as worthy of the position of Vice-Presidents. The Executive Council had, however, made no recommendation as to any addition to the present list. Upon this a discussion ensued as to whether it was not requisite, according to the rules, to have annual re-elections of all officers of the Institute great or small, and in case there should be any difficulty as to this the Chairman moved, and Mr. Greenfield seconded, that the present President and Vice-Presidents stand re-elected, if re-election be found necessary.

The General Council list was then read over by the Secretary, and the whole of the gentlemen on the list were, on the motion of the Chairman, seconded by Mr. Greenfield, unanimously re-elected.

It was resolved, on the motion of the Chairman, seconded by Mr. F. W. Campin, that the retiring members of the Executive Council, namely, Messrs. Blanchett and T. Paterson, be re-elected, and in the place of Captain Fairholme, who has retired from the Institute, Mr. J. P. Cutts, be elected as a member of the Executive Council.

It was moved by the Chairman, and seconded by Mr. Blanchett, that Mr. F. W. Campin be re-elected Secretary. This resolution was supported by Mr. J. Greenfield, who desired to add an expression of opinion on behalf of the members of the Institute of the advantage gained by its retaining the services of a gentleman so earnest in the cause of Patent Law reform, and so well qualified to advise the Institute on the legal questions involved therein.

It was moved by the Chairman, and seconded by Mr. Blanchett, and carried unanimously, that Mr. J. P. Cutts be elected the Auditor of the Institute.

It was moved by the Chairman, and seconded by Mr. Blanchett, that the rules be in practical effect so far amended that nothing therein contained shall be deemed or taken to require Executive Council meetings to be held during the months of July, August, or September, unless specially required.

The usual votes of thanks to the President, Vice-Presidents, Executive and General Councils, the Secretary, and the

Auditor, also a special vote of thanks to the Chairman of the day, F. H. Varley, Esq., C.E., closed the proceedings.

PORTLAND CEMENT AND CONCRETE.

At the Institution of Civil Engineers, on 11th May, W. H. Barlow, F.R.S., President, (a Member of the Executive Council of the Inventors Institute), in the Chair, three papers were read, the first on "The Manufacture and Testing of Portland Cement," by Major-General H. Y. D. Scott, C.B., R.E., F.R.S., Assoc. Inst., C.E., and Mr. Gilbert R. Redgrave, Assoc. Inst. C.E.

The history of the early manufacture of Portland Cement was involved in considerable obscurity, and the conditions which had rendered possible the manufacture of the cement, now recognised as Portland, seemed to have been arrived at only very gradually. The term "Portland Cement" first occurred in the specification of a patent granted to Joseph Aspdin, a bricklayer of Leeds, in 1824. Aspdin did not appear to have made true Portland Cement, nor was his mode of manufacture identical with that which had since been generally adopted. His son Wm. Aspdin was, however, one of the earliest makers of genuine Portland Cement, and had a factory at Northfleet, trading with partners as Maude, Jones, and Aspdin. Subsequently as Robins, Aspdin, and Co., he shared with Messrs. J. Bazley White and Sons, the reputation of having been the founders of the Portland Cement manufacture in the London district. The elaborate series of tests conducted for the Metropolitan Board of Works by Mr. John Grant, M. Inst., C.E., between the years 1859-71 might be said to have placed Portland Cement in the first rank as a building material, and it had been the means of fixing and formulating the knowledge of this material. Mr. Grant's observations had been supplemented by those of Messrs. Colson, Mann, and others, and there now existed a vast store of information respecting the use and treatment of Portland Cement. Mr. Henry Reid had also thrown much light upon the manufacture and production of this cement.

The raw material suitable for the manufacture of Portland Cement existed in great abundance in nature, and, with proper care, a high-class Portland Cement might be produced in almost any country. The mode of mixing the chalk and clay generally employed in England for the manufacture of the cement was not so systematic as could be desired. The old-fashioned plan was to wash together, or incorporate, the chalk and clay with a large excess of water in a wash-mill. The resulting milky fluid, or wet slip, was then run into a series of shallow reservoirs, or backs, where these ingredients subsided, and the clear top-water was gradually drawn off from the surface. After remaining for six or eight weeks in the backs, the slip, which had attained a pasty consistency, was removed in barrows to drying floors, where the remaining water was expelled by bottom heat, conducted in flues. The dry slip was then calcined in kilns with inter-stratified coke, and the clinker which was produced was ground into a fine powder, and was ready for use as Portland Cement.

The modern plan was to grind the chalk and clay together, with the smallest quantity of water possible, and to ensure the perfect reduction of the coarse particles, either on the method of Mr. W. Goreham, by passing the wet slip through mill-stones, or, as recommended by Mr. V. de Michele, by employing a rubbing surface of metal plates which surrounded the wash-mill. In the most recently improved plan of drying, the wet slip was conducted at once into chambers attached to the kilns, and the waste heat from the calcination served to dry the next charge. This plan was invented by Mr. I. C. Johnson. Mr. de Michele had also employed the waste heat from the kiln, which involved the use of a roof over the chambers. Other plans of utilising the hot gases from the kilns had been introduced by Messrs. J. B. White and Brothers, and by Mr. R. A. Gibbons. In grinding the clinker, it was of great importance to reduce the cement to a fine state of sub-division, and to exclude all "core," or hard particles, by sifting, as the hard particles might be sources of danger to the cement; at the best, they only acted as so much sand. All cement was benefited by spreading it in thin heaps on the floor of the warehouse; this operation was termed "purging" the cement.

Passing on to the subject of testing, the authors stated that, strange and anomalous as it might seem, although except in rare cases Portland Cement was never used neat, or subjected to a direct tensile strain, it had been the universal practice to test the neat cement by means of tension. German cement users and producers had resolved, after a general conference, to adopt a sand test, and to employ a standard testing machine. The sand test was made with 3 parts of prepared sand to 1 part of cement. The briquettes had a sectional area at the neck of 5 square centimetres, equal to 0·775 square inch. The briquettes were tested twenty-eight days after they had been made, one day being passed in air and twenty-seven days in water. The breaking weight, in a machine of special construction, had been fixed at the rate of 113·8lbs. per square inch. The mode of preparing the sand by sifting out all the coarser and finer particles was provided for, and also the quantity of water to be employed. The authors, after due consideration of the various difficulties and objections to a change in the mode of testing Portland Cement, proposed the following general tests for English Cement:— 1. The whole of the cement to be ground fine enough to pass through a sieve of 40×40 = 1,600 meshes to the square inch without residue. 2. The cement to weigh not less than 85lbs. per cubic foot, filled from an inclined plane, at an angle of, say, 45 degrees. 3. The cement tested with 3 parts of standard sand, must have a minimum strength of 112lbs. per square inch in twenty-eight days, during one day of which it had been in air and twenty-seven days in water.

The second paper read was on "Portland Cement Concrete, and Some of its Applications." By Mr. E. A. Bernays, M. Inst., C.E.

In this communication the author gave the results of his experience in carrying out the large works for the extension of H. M. Dockyard at Chatham. When these works were commenced, in 1867, so little confidence was placed in Portland cement, that that material was not even mentioned in the contract specifications; grey stone lime, blue lias lime, and pozzolana being specified for all descriptions of mortar and concrete. Soon afterwards, however, it was found desirable to substitute Portland cement for the above materials. For all ordinary concrete, it was ascertained that a mixture of 1 part of Portland Cement with 12 parts of shingle, gave a better result at the same or less cost than the concrete provided for in the specification, to be composed of one part of Warwickshire blue lias lime to 6 parts of shingle. The Portland cement used throughout the Admiralty Works had been of good, but not of a costly character. It was specified to weigh not less than 112lbs. per bushel, to be finely ground, and to bear a breaking strain of not less than 650lbs. on the section of a briquette 1½ inch by 1½ inch. In a total quantity of upwards of 50,000 tons, the mean weight was 116½lbs. per bushel; the average breaking strain of a briquette, of the above section, 773½lbs.; and the fineness, such as to allow not less than 75 per cent. by weight to pass through a sieve with 50 meshes to the lineal inch. The author, while admitting the superior value of fine grinding of cement, when combined with great weight, expressed a doubt whether in England, where a fairly good article could be got, at moderate cost, it was worth while to incur the increased expense of heavy and very finely-ground cement. When used in foreign countries, where the cost of freight and transport was serious, he thought that almost any outlay on the first cost of the cement, to make it go further, when mixed with sand or gravel, was desirable. The large concrete walls at Chatham had been singularly free from the horizontal and vertical cracks so often noticeable in concrete walls. The author attributed this partly to the uniform practice of turning out all cement from the bags into a shed for, at least, three weeks before using, and partly to the care taken to carry up the work in long lengths each day, instead of in great heights. His practice was to carry up the work in about 18-inch lifts only. Over the greater part of the works at Chatham, the walls, though mainly of concrete, were faced with a veneer of brickwork 3 feet thick, with bond courses of brickwork 21 inches thick, passing through the walls at intervals of 6 feet in height. At the eastern end of the works, however, the great depth at which satisfactory foundations were found, and the necessity of passing through 35 feet of soft mud before reaching good bottom, necessitated much greater strength and consequent thickness of walls. In order to construct these without increased cost it was decided to omit the brickwork, and build them wholly of concrete. While it was considered that, for all purposes of strength as a retaining wall, concrete made of 1 part of cement to 12 parts of shingle was amply sufficient, it was felt that concrete so made was not strong enough to withstand the rubbing of ships' fenders, boats, or vessels. Early in 1874 the author tried the experiment of facing this common concrete with a coating, 9 or 10 inches in thickness, of superior concrete carried up simultaneously with the commoner material. This concrete was composed of 4 parts of furnace-slag broken into small cubes by a stone-crusher, 2 parts of clean Thames sand, and 1 part of Portland cement. The experiment proved successful, the adhesion between the two descriptions of concrete being perfect. All the exposed surfaces of concrete walls built since that date had been so faced. The same principle had been applied to the lining of subways, culverts, penstock shafts, &c.; but, in these cases, where the face of the concrete was less liable to abrasion, broken flints had been substituted for the furnace-slag, owing to the difficulty of procuring the latter, in the locality, in sufficient quantity. For all concrete, but especially when used for facing, the author advocated a free use of water in mixing. He had never found any disadvantage from the use of concrete in a wet state. The success that attended the facing of vertical surfaces of walls with superior concrete had led to its use in many other ways. He had applied it to the horizontal and vertical faces of copings and steps, for curbs to street paving, for the areas and yards of dwelling-houses, floors of kitchens and sculleries, and to the facing of concrete blocks for house-building. For copings and steps he made use of granite spauls crushed into small cubes; but for all surfaces exposed to foot traffic he preferred small pebbles of shingle that would pass through a ¼-inch mesh sieve. While for ordinary concrete, on faces or elsewhere, the author used a minimum of one-third of the entire bulk of sand; where the concrete was exposed to foot traffic he had found it necessary to wash out all sand, and to use Portland Cement only as the matrix for the flint, pebbles, crushed granite, or furnace-slag. His practice was to use for these facings 1 part of Portland cement to 2 parts of the aggregate, whatever it might be. For the copings of sea walls he applied a facing 2 inches thick, but for ordinary footways or paving a facing of only ¾-inch was considerably more durable than the best Yorkshire paving. At ordinary London rates the author estimated the cost of concrete walls, composed of 1 part of Portland cement to 12 parts of shingle, at 7s. 2d. per cubic yard, of 1 to 9 at 8s. 2½d., and of 1 to 6 at 10s. 3d. He estimated that the timber framing added from 4d. to 6d. per cubic yard to the cost of the walls, and the facing of slag or flint about 2½d. per cubic yard on thick walls. At these rates such walls as had been built at Chatham could be constructed, including facing and framing, at something less than 8s. per cubic yard.

The third paper read was on "Portland Cement: its Nature, Tests, and Uses," by Mr. John Grant, M. Inst. C.E.

After referring to the greatly extended use of Portland Cement during the last 20 years, to the improvements which had been made in its manufacture, and the care given to the best methods of economising its use and testing its quality, attention was drawn to what had been done in Germany, more especially during the last four years. In January, 1877, a committee, appointed the year before, of four Associations of Engineers, Architects, and Manufacturers of Cement, &c., had, at their meeting in Berlin, agreed upon a series of rules to be observed in the production and supply of cement. By these the weight to be supplied in casks and sacks was determined, and certain tests established for the quality of cement, particularly as to its fineness and tensile strength. The latter was to be tested by briquettes of uniform shape and dimensions (5 square centimetres breaking area), made of cement and sand, in the proportion of 1 part of cement to 3 parts of sand. The apparatus for this purpose was agreed upon. The age of the briquettes when tested was to be 28 days. The cement was to be ground so fine that the residue on a sieve of 900 square centimetres, equal to 72·2 per lineal inch, should not exceed 25 per cent. This was afterwards reduced to 20 per cent. The sand for testing was to pass through a sieve of 60 meshes per square centimetre, and to be retained on one of 120 meshes per square centimetre, equal to about 20 and 28 meshes per lineal inch. The tensile strength after 28 days was at first 8 kilogrammes per square centimetre, equal to about 114lbs. per square inch, but was afterwards increased to 10 kilogrammes per square centimetre, or about 142lbs. per square inch. There could be no doubt that the standards thus established for fine grinding, and for testing the cementitious value of cement when mixed with a large portion of sand, had exercised a beneficial influence on the quality of the Portland cement manufactured and used in Germany. This result had been arrived at by a combination of the knowledge and ability of those who produced, and those who had to use, this important article. The same standard rules, with slight modifications, were afterwards adopted in Austria. To these standards all cement manufactured in, or imported into, these countries must conform. In England engineers and cement manufacturers had not been idle, and the subject was now much better known than it was 20 years ago.

A brief description was given of the more essential points in the manufacture of cement, the materials used, and the burning and grinding. Reference was then made to the characteristics of good cement, its weight, fineness of grinding, freedom from tendency to expand or blow, its time of setting and hardening, the effect of time, heat, and moisture, the influence of sulphate of lime and acids, the proportion of sand used with it, the coarseness or fineness of the sand or gravel, its mineral character, and freedom from dirt, grease, clay, or soft foreign matter. The weakening effect of using too much water was pointed out, and the advisability of compressing or ramming concrete when possible. The relative advantages of using concrete in blocks, and in a soft state, and of keeping it damp till it had thoroughly set, were pointed out. The different modes of testing by compression and by tensile strain were then discussed, and the apparatus used in Germany, and in the experiments quoted in the appendix to the paper, were described, with the modifications and improvements in the form of the briquettes, and in the mode of making them. Suggestions were next offered for testing cement in a uniform manner, so as to prove its soundness, strength, cementitious value and other qualities, and to admit of comparison with other observations. The harbour at the North Sea entrance to the Amsterdam Canal, the Victoria Docks, North Woolwich, and the Docks at Chatham, were mentioned as recent examples of works on a large scale made entirely of Portland cement concrete; and the numerous purposes to which it was now applied, and the economy effected by its use in the sewers and embankments of the metropolis, were alluded to.

In an appendix were numerous tables illustrating the different points referred to in the paper, such as the specific gravity and analyses of different cements; the results obtained by different modes of testing briquettes of various forms and sizes, and when made with different proportions of cement, sand, and water. From these it was shown that there was great increase of strength and economy by grinding cement very fine. Some coarsely ground cement gave high results when tested neat, but low when tested with sand. The tests proved the impossibility of ascertaining the true cementitious value of cement by testing it neat, or otherwise than with a mixture of sand, and also showed the waste involved in coarsely ground cement. The influence of sand of different degrees of fineness, of the time which cement took to set, the strength of various limes, selenitic limes and cement, the tensile and compressive strength of the same cements, some experiments on expansion, with form of specification for cement, for mortar and concrete, and tabulated forms for registering results of tests and experiments were also given.

SONG.

WERE Paradise' bright streams my own,
They'd murmur to enchant your ear;
And ev'ry charm earth has not known
Enwrap the misty landscape near.
All you have dreamt of bliss divine,
Should breathe the air of Eden round you,
And fate's worst frowns become benign;
Love should so charm the woe that bound you!
Ah! so I'd shelter you.

What can I give to make you blest?
My very soul is all your own,
As it has been in deep unrest;
The severing days so slowly flown.
Could I lift your grief-burden up,
And bear it with me to the grave;
Believe me, life's divinest cup
Would press to lips it could not save!
Ah! could I shelter you.

V. GONVILLE

GAS AND ELECTRICITY.

IN his recent inaugural address before the Society of Telegraph Engineers, London, President W. H. Preece said:—

The electric light has been making considerable progress, and is gradually forcing itself into practical use, in spite of many of the drawbacks to its employment that have yet to be removed. The lamp of the future has not yet been produced, though steadiness and duration have very much advanced during the past twelve months. There is very little room for improvement in the generating machine, for both the Siemens and Gramme machines convert about 90 per cent. of the energy thrown into them into electric currents, and this is a duty which no other kind of machine can show.

One of its most notable and useful applications has been on board ship, to further the operations during the night in laying and repairing cables. I was present on board the steamship Dacia, in the Mediterranean, when this was done, and the success was unequivocal.

The Brush machine has recently been introduced into this country, and its performances are certainly wonderful. It produces an electromotive force of over 800 volts, and I have seen it maintain 20 very steady arcs joined in series. Sixteen appear to be its efficient limit, and this number of lamps, giving over 1,000 candle power, are easily maintained by an expenditure of 13½ horse power. The performances of the Brush light are certainly the most advanced form the electric light has yet taken. There are over 800 of these lights in the United States; and it is worthy of notice that it has quietly crept into existence without the aid of the ubiquitous and omniscient newspaper correspondent, or the transmission of any sensational telegrams, to the detriment and discomfort of gas shareholders.

It is assumed by many that the electric light is devoid of heat, but Professor Dewar has shown that a Siemen's arc radiates heat equivalent to 3 horse power per minute. Moreover, the use of such powerful currents, unless carefully directed, are dangerous to life and limb, and may even, unless properly protected, result in fire.

Gas is not going to be affected by the electric light. The proper function of gas is to generate heat. 94 per cent. of the ingredients of gas are consumed in generating heat, and only 6 per cent. in producing light. It is remarkable that so amenable and tractable an agent for heating purposes has not been more utilised, but the fact is that the public is ignorant of its properties, careless of its employment, and callous of its defects. It is not too much to say that 50 per cent. of the gas manufactured is absolutely wasted for illuminating purposes by the wild extravagance with which it is burnt, and by the want of those systems of regulation which have been introduced to compensate for irregularities and excesses of pressure.

AN APPEAL.

Mr. WILLIAM TEMPLETON, well-known in his day as the author of many valuable mechanical books, died some years ago, leaving a wife and family in necessitous circumstances. His daughter, now sixty years of age, struggled hard to support her aged mother, but her aid, it appears, can be no longer relied upon, hence an appeal has been made on behalf of the family. Subscriptions can be paid to our contemporary *Engineering*, at 37, Bedford-street, Covent Garden, London, or to Mrs. Templeton herself, at 26, London-street, London-road, Southwark, London, S.E.

A simple, convenient, and inexpensive refrigerator crate for transporting butter, fruits, meats, game, &c., has been patented by Mr. George W. Freeman, of Amboy, Ill.

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President, SIR ANTONIO BRADY.

THE SESSION 1879—1880

Members' Meeting at 8.15 p.m. on Thursday, June 3rd.

On June 3rd G. E. Pritchett, Esq., F.A.S., &c., on Important Improvements in Barometers and Thermometers.

Executive Council Meeting at 7.30, on same evening as above.

The Balance Sheet 1879-80 can now be inspected.

Subscriptions are payable to Mr. G. A. Stretton, the Receiver, 4, St. Martin's-place, S.W., who is the proper official to give receipts.

F. W. Campin, Sec.

Proceedings of the Institute.

Members' Meetings.

On Thursday, 6th May, the meeting was arranged for "An Exposition of Inventions, and Discussion of Patent Law Question;" however, nothing transpired requiring special notice.

On Thursday, 28th May, the Annual General Meeting was held at 4.15 p.m., and the proceedings are fully reported in another column.

Executive Councils.

On the 6th May no business was transacted requiring to be reported to the members in general.

On the 20th May, after passing the minutes of the last meeting of Executive Council, the draft report for the year 1879-80 was read, approved of, and ordered to be presented to the Annual General Meeting to take place on same day (this report is given in the account of the proceedings at the annual meeting).

The balance-sheet—Part I. receipts and expenditure, and Part II. assets and liabilities—which had been audited by the Honorary Auditor, Mr. J. P. Cutts, was put in by the receiver, Mr. G. A. Stretton, acting treasurer, and having been read by the Secretary, was passed, and ordered to be presented to the general meeting.

Mr. Anderson's proposed Patent Bill was approved of, and the Executive Council then adjourned.

Monthly Notices.

A new Use for the Telephone has been found by Herr Niemöller, it being capable of determining very quickly and accurately the resistance of liquids. It is substituted for the galvanometer in a galvanic bridge, and an induction current is used; then, if the resistances compared consist of a large liquid resistance on the one hand, and a Siemens resistance box on the other, so that the electro-dynamic constants of the branches are very small; if, further, a German silver or platinum wire be used as measuring wire; it is found that in the position where the galvanometer shows no deflection, the tone in the telephone has a well-marked minimum of intensity. Supposing the liquid resistance has 2,000 units, a variation of it, even 4 units, reveals itself in a displacement of the minimum position.

Ultra Violet Solar Radiation at Different Altitudes.—M. Cornu has been making some very exact experiments on absorption of same, the results of which he brought before the Académie des Sciences very recently. These observations prove that the absorption is not due to water vapour or to material particles, as generally believed, but that it is exercised by the gaseous mass of the atmosphere itself.

Spheroidal Matter.—M. Boutigny, at a recent Séance of the *Académie des Sciences*, gave a *résumé* of the laws which rule matter in the spheroidal state. His fifth law of repulsive force at a sensible distance is represented as the most important, because antagonistic to universal attraction. Non-volatile bodies, as wax or tallow, are suspended in a red-hot capsule without vapour or gas arising from their decomposition. Water dropped from the height of 70 feet upon heated metal is repelled instantaneously by the repulsive force of the heat.

Salicylic Acid for the Preservation of Water and Wine is recommended by Herr Kolbe. It has been found, however, that either of those fluids treated with this acid, if kept in wood casks, exhibits no evidence of the presence of salicylic acid after a few months, the wood of the casks either destroying the acid or absorbing it.—*Athenæum.*

Dr. James Geikie, F.R.S., will shortly send to press a work entitled 'Prehistoric Europe: a Geological Sketch,' which treats of the principal climatic and geographical changes which have taken place in our continent since the commencement of the pleistocene or quaternary period. Mr. Stanford will be the publisher.

The Royal Society.—Out of the fifty-two candidates for the fellowship who have come forward during the present session fifteen have been recommended for election by the Council, namely, Thomas Clifford Allbutt, M.A., M.D., F.L.S.; Prof. John Attfield, Ph.D., F.C.S.; Henry Francis Blanford, F.G.S.; Rev. William Henry Dallinger; William Turner Thiselton Dyer, M.A., F.L.S.; Lieut.-Col. Henry Haversham Godwin-Austin; the Right Rev. Charles Graves, D.D., Bishop of Limerick; Prof. David Edward Hughes; Henry M. Jeffery, M.A.; Prof. Frederick M'Coy, F.G.S.; J. Fletcher Moulton, M.A.; Prof. Charles Niven, M.A., F.R.A.S.; John Rae LL.D.; Prof. J. Emerson Reynolds, M.D.; William A. Tilden, D.Sc. Of these two are mathematicians, three physicists, three chemists, two geologists, two naturalists, one physiologist, one botanist, and one geographer, ethnologist, and Arctic explorer. The election will take place at a meeting of the Society to be held on Thursday, June 3rd, at 4 p.m.

Bonsilate is the name given to a composition now being used in America as a substitute for ivory, hard woods, and the like; canes, dominoes, clock-cases, and ornamental objects are made of this new material. It is said to be made from finely ground bones agglutinated with silicate of soda.

The Source of the Force Exciting Electricity.—Every heat-phenomenon, emission as well as absorption, occasions under favourable circumstances an electric current. The current produced by the emission of heat has the opposite direction from that produced by absorption. If only one metal in a galvanic element is active, the electric force is proportional to the algebraic sum of the heat developed by the bodies acting upon each other within the element. If both metals are active the electric force is proportional to the difference of the algebraic heat-sums on the one and the other side. The power of polarisation in exciting electricity depends neither on the nature of the gas nor of the metal, but mainly on the chemical action springing from electrolysis. The power of two metals in one acid to produce electricity stands in a simple proportion to the heat which the metals in question evolve when they unite with the acid to form salts.

The Scientific Review
AND
SCIENTIFIC AND LITERARY REVIEW,
A RECORD OF PROGRESS IN
ARTS, INDUSTRY, AND MANUFACTURES.
INCORPORATING THE
JOURNAL OF THE INVENTORS' INSTITUTE.

JUNE, 1880.

THE CRIMINALITY OF BAD PATENT LAWS.

An appalling Boiler Explosion has occurred at Walsall, the dire effects of which as regards human life and suffering are described in a letter from the Mayor of that town (George Thomas, Esq.), which has appeared in the daily journals, and states the case as an appeal to the benevolent on behalf of the widows and orphans and other dependent relatives of the men who were killed and severely injured by that dreadful boiler explosion. Twenty-five are dead, and other deaths are expected. Including the families of all these, and of others who are temporarily disabled, we have (he says) a total of upwards of 120 persons to provide for. Most of these are in a state of abject poverty. Walsall is not a rich town, and moreover has long been severely suffering from the effects of trade depression. Nevertheless, a town subscription has been commenced, and has been most handsomely supported by many who, it is not too much to say, have strained liberality to the utmost in manifesting their sympathy for the poor widows and orphans who have sustained this crushing blow. The local fund now amounts to £2,000, but as the total of £6,000 which it is desired to reach is far too heavy a burden for this community, it is hoped that many humane persons amongst the general public will come forward to assist in a cause that appeals to all the tenderest feelings of our common nature. Now a calamity like this, if preventible, must somehow and somewhere entail criminality, and probably we shall (as is usual in such cases) have a desperate attempt made by men in authority to fix the criminality in the form of a charge of neglect of duty resulting in homicide, upon some fireman or attendant on the boiler who can be easily caught hold of and detained by the strong arm of the law. Certainly the last thing that will be done will be to throw the blame upon the great men conducting the government of the country, who by their perverse apathy or opposition as to the solution of questions which affect the progress of industrial, sanitary, and other improvements in our material well-being, have hindered our having command of means and appliances by the aid of which we might hope to be spared much of the calamitous effects of such dreadful accidents as above referred to.

Such thoughts as we have given utterance to are not the expression of the exaggerated views of a red-hot advocate of invention and inventors, and this will we think be conceded when we state that the learned Recorder of Walsall, Mr. J. S. Neale (whose impartiality should be unquestionable), according to a telegram to the *Echo,* in charging the Grand Jury said the recent boiler explosion at Walsall was a most melancholy and appalling lesson of the dangers that surround all modern machinery connected with steam, and of the necessity of adopting all safeguards that invention could suggest. It was within his knowledge that a patent to prevent boiler explosions, and which had every prospect of rendering such an accident as the recent calamity all but impossible, was on the point of being taken out ten years ago, but was delayed, and would probably be lost, through the unjust action of the Patent Laws. There was no law which ingenuity could frame which would confer a greater benefit on trade and commerce, also on humanity at large, than a reform in the Patent Laws by the reduction to the smallest and most nominal amount of the fees and costs in taking out new patents; and, in the place of such reduction, the substitution of an *ad valorem* duty of say five per cent. on every sale or transfer of every patent which by its success had become valuable. The comparative trifle for which patents could be protected in America was one great cause why she had gone ahead of us in scientific matters.

If these statements give a true view of the case it is evident that those who oppose the very existence of Patent Laws, like Lord Granville and Lord Chancellor Selborne, and even those persons like the members of the late Beaconsfield Government, who palter with the question and eventually leave it untouched, incur the grave responsibility of being constructively and eventually guilty of manslaughter in a moral, though not legal, point of view, and they will certainly deserve to be charged with the highest culpability, if after the warning thus given by the Walsall accident as set forth by the Recorder, the progress of Mr. Anderson's Bill for the amendment of the Patent Laws, by cheapening the cost of patents and providing for the better administration of Her Majesty's Patent Office, be stopped, unless indeed the Government will bring in and push forward another measure cheapening patents still more, and more thoroughly amending the Patent Laws. And no mere political improvement, how muchsoever it may please party men, can be balanced against a matter of such vital importance.

Proceedings of Societies.

ROYAL SOCIETY.

April 8th.—The President in the chair.—The following papers were read: "Note on Thermal Transpiration," by Prof. O. Reynolds,—and "On the Sensitive State of Vacuum Discharges," Part II., by the President and Mr. J. F. Moulton.

April 15th.—The President in the chair.—The following papers were read: "Description of some Remains of the gigantic Land-lizard (*Megalania prisca*, Owen) from Australia," II., by Prof. Owen, F.R.S.,—"On an Electro-magnetic Gyroscope," by Mr. W. de Fonvielle,—and "Report on the Exploration of the Caves of Borneo," by Mr. A. H. Everett.

INSTITUTION OF CIVIL ENGINEERS.

April 6th.—Mr. W. Barlow, President, in the chair.—The monthly ballot resulted in the election of six Members, viz., Messrs. R. Baillie, W. F. Batho, J. Dillon, C. H. L. Kühl, C. Y. O'Connor, and A. Sopwith; of sixteen Associate Members, viz., Messrs. R. F. Alford, J. Allsopp, A. E. Baldwin, W. Belton, P. H. Brown, C. G. Clarke, W. Cooper, R. F. de Salis, J. T. Earnshaw, C. J. Grierson, W. H. Jones, E. T. Lang, A. H. V. Newton, I, Spielman, W. M. Vivian, and G. Wade; Mr. R. Anderson was made an Associate.

ROYAL INSTITUTION.

April 5th.—G. Busk, Esq., Treas. and V.P., in the chair.—Mrs. W. T. Houldsworth, Mrs. W. Huggins, Capt. M. H. Purcell, Capt. H. J. L. Turnbull, Rev. W. T. Houldsworth, Prof. J. Dewar, Messrs. W. Hills, G. Kelly, C. Paget, S. A. Ralli, and P. W. Squire were elected Members.

SOCIETY OF ARTS.

March 11th.—Prof. H. Roscoe in the chair.—A paper "On Balmain's Luminous Paint" was read before the Chemical and Physical Section by Prof. Heaton.

March 16th.—Sir T. D. Forsyth in the chair.—A paper "On Transport and Trading Centres for Equatorial Africa," was read before the Foreign and Colonial Section by Capt. Foot.

March 17th.—Lord A. Churchill in the chair.—Seven candidates were proposed for election as Members.—The paper read was "On the Art of the Silversmith," by Mr. H. Singer.

April 2nd.—Andrew Cassels, Esq., in the chair.—Mr. Houghton read a paper before the Indian Section of the Society "On the Best Route for a Railway to India."—A discussion followed, in which, among others, Sir. A. Cotton, Capt. V. Lovett Cameron, and Mr. Hyde Clarke took part.

April 5th.—the first lecture of a course of Cantor lectures "On the Decoration and Furniture of Town Houses" was delivered by Mr. R. W. Edis. The lecture was of an introductory character, and dealt with the influence of schools of art on design, the change introduced by fashion in decoration and furuiture, and the moral influence exercised by artistic decoration.

April 6th.—R. B. Carter, Esq., in the chair.—A paper ' On Art in Japan" was read before the Foreign and Colonial Section of the Society by Mr. C. Pfoundes. The paper was fully illustrated by specimens of the art productions of Japan, and by a collection of photographs and native drawings of the scenery and principal buildings and temples of that country.

April 7th.—Prof. Williamson in the chair.—Fourteen candidates were proposed for election as Members.—A paper "On Buildings for Secondary Educational Purposes" was read by Mr. E. C. Robins.

ASTRONOMICAL SOCIETY.

April 9th.—E. Dunkin, Esq., V.P., in the chair.—Lieut. T. P. Battersby was elected a Fellow.—The Astronomer-Royal was called upon to read a paper "On the Lunar Theory." He said: "Before I commence my paper I wish to refer to a matter which has no connection with my paper. I was prevented by illness from attending the anniversary meeting of the Society, or I should have been glad to advert to the volume of 'Observations made during Total Eclipses' which has been published by the Society, under the care of Mr. Ranyard, and to have said that I think it does honour to the Society as well as to Mr. Ranyard. In the *Monthly Notices* for January, 1874, I explained a new method of treating the lunar theory, in which the co-efficients were to be numerically investigated. I have been closely occupied upon the subject since that time, and I may say that for many years previously it had received a large share of my attention, and I now present the results contained in this paper with much confidence. I need not say that the matter is of great importance, especially with respect to distant chronology and the identification of early total solar eclipses, and I think I have worthily bestowed some trouble on this subject if it enables us to speak with greater certainty as to such identifications."—Mr. Christie read a paper, by Mr. Ellery, of Melbourne, on the great southern comet, which was observed by him from the 9th to the 17th of February. At first its tail was forty-five degrees long, but on the 12th of February it had almost disappeared to the naked eye, and on the 17th it could only be observed with difficulty with the telescope.—A paper from Mr. Russell, of Sydney, on the same subject, was also read; and a letter from Mr. Hind (the President of the Society), in which he stated that there appeared to be a great similarity between the elements of this comet and those of the comet of 1843. Prof. Winnecke is also of opinion that the comets of 1843 and 1880 are identical, and he suggests that they may also be identical with the comet of 1695. The observations of the comet of 1843 were not such as to give a very satisfactory determination of its period. Hubbard determined its period to be thirty-seven years, but a parabolic orbit would also fairly satisfy the observations. Prof. Weiss, of Vienna, is of opinion that this comet may also be identical with the comet 1106, which also passed very near to the sun, but from the meagre accounts of its place amongst the stars its orbit can only be very roughly determined.—Mr. Marth suggested that the very unequal period between the returns to perihelia of these comets might probably be accounted for by the resistance of the corona through which the comet would pass at its perihelion passage. Sir Isaac Newton's comet passed within a distance of three-tenths of a solar radius of the photosphere.—Mr. Common read a paper "On the Nebula in the Pleiades," which he had observed with his 36-inch telescope; he had been unable to see anything of the comet, although he had carefully searched in the positions indicated in Mr. Hind's ephemeris.

SOCIETY OF ANTIQUARIES.

April 8th.—E. Freshfield, Esq., V.P., in the chair.—The Auditor's Report was read, and notice was given of the anniversary meeting, for the election of the Council, President, Trersurer, and Director, on Friday, April 23rd (being St. George's Day), at 2 P.M., and that no Fellow in arrear of his subscription would be entitled to vote on that occasion.—Mr. A. W. Morant communicated to the Society that he had in his possession three iron chests, similar in character to those exhibited by Mr. Robins on May 29th, 1879, and described in the *Proceedings*, 2nd series, vol. iii. p. 165.—Mr. H. M. Westropp exhibited what he stated to be a Saxon iron sword, found in the Isle of Wight, at St. Lawrence, near Ventnor, in the cleft of a rock, about six feet below the surface. Mr. A. W. Franks observed that this object should rather be called an iron bar, to be hereafter made into a sword-blade, than a finished sword. Objects of a precisely similar character, 147 in number, had been found close together at Bourton-on-the-Water, and were described in the *Proceedings*, 2nd series, vol. i. p. 233; see, too, 1st series, vol. iv. p. 188. He had also given an account himself of similar bars or blades found in this country in one of the forthcoming volumes of *Archæologia*, xiv. ii. p. 263.—Mr. W. M. Wylie communicated a paper on certain masses of smelted iron found in Switzerland and other countries. The Swiss specimens had been found at Hedinger, near Zurich, about eight feet below the surface. These masses were of quadrangular form, with ends diminishing to points, after the manner of a double pyramid. Mr. Wylie, called attention to similar specimens in other parts of the Continent.—Mr. J. J. Rogers exhibited, through the Director, some Anglo-Saxon antiquities of silver, discovered many years since at Trewkiddle, near St. Austel's, Cornwall. They were found in 1774, when searching for tin, in an ancient streamwork, and were exhibited so long ago as May, 1788, before the Society by the then owner, P. Rashleigh, Esq., of Menabilly, in Cornwall. They are figured in the *Archæologia*, vol. ix. p. 187, pl. viii. The most remarkable of these objects was a double-plaited chain of silver, dividing at the lower end into four strings, terminating in knots, and supposed to have been a *disciplinarium*, or penitential scourge. Another object seemed to be a chalice, with a semi-egg-shaped bowl, now much broken, a short baluster-shaped stem, and a splay-foot. With these remains were found a number of Anglo-Saxon coins, from which the date of the deposit may be assigned to the year 878.—Mr. M. H. Bloxam communicated a paper on the ancient Roman station of Tripontium, which he contended had been misplaced, and which he identified with Cave's Inn, on the site of the Watling Street Road.

ZOOLOGICAL SOCIETY.

March 16th.—Dr. A. Günther, V.P., in the chair.—The Secretary read a Report on the additions made to the Menagerie during February, and called apecial attention to several novelties, amongst which were two female Thars (*Capra jemlaica*), mother and young, presented by H.R.H. the Prince of Wales on the 5th of February, and two Burrhel wild sheep (*Ovis Burrhel*), purchased Feb. 19th.—Mr. W. K. Parker exhibited and made remarks on the eggs and embryos of some crocodiles obtained in Ceylon by Dr. W. R. Kynsey.—Papers and letters were read: by Mr. W. A. Forbes, on some points in the anatomy of the Sumatran rhinoceros,—by Mr. E. R. Alston, on a coloured drawing of an adolescent specimen of *Tapirus Dowi*, now in the Paris Museum (Mr. Alston also exhibited a specimen of a remarkable and little known Australian marsupial, *Antechinomys lanigera*, Gould),—from Mr. L. Taczanowski, on a collection of birds made in Northern Peru by Mr. Stolzmann during the last months of 1878 and the first half of 1879: amongst them were examples of three species believed to be new to science, and proposed to be called *Turdus maranonicus*, *Arremon nigriceps*, and *Colaptes Stolzmanni*,—by Mr. A. Craven, on three new species of land and fresh-water shells from Nossi-Be Island, north-west coast of Madagascar,—by Mr. Craven, on a collection of land and fresh-water shells made during a short expedition to the Usambara country, in Eastern Africa, with descriptions of seven new species,—by Mr. F. J. Bell, on certain statements made by Mr. A. Agassiz in a paper on the synonomy of the Echini, communicated to the Society at a previous meeting,—and by Mr. W. K. Parker, on the skull in the chameleons.

CHEMICAL SOCIETY.

March 18th.—Mr. Warren De La Rue, President, in the chair.—Prof. Tidy read a lengthy paper "On River Water." He discussed the subject under three heads—1. Analytical details of river waters; 2. The various sources of impurity to which river water is subject, and the means whereby purity is maintained by nature or may be effected by art; 3. The extent to which statistics warrant us in condemning or in approving the supply of river water for drinking purposes. Under the first head the author gives detailed analyses of water from the Thames from 1876 to 1879. Analyses are also given of water from the rivers Nile, Severn, and Shannon. Under the second head is discussed the effect (1) of flood water, which at first deteriorates and then improves the quality of river water; (2) of peat, the quantity of which in a water is kept in check by, *a*, the inherent power that water possesses of self-purification, owing to the oxidation of the peat by the oxygen held in solution in the water; and, *b*, mechanical precipitation by admixture with coarse mineral matter suspended in the water; (3) of sewage matter. This, in the opinion of the author, is a most vital question. From inspection of the effect produced by sewage on rivers, from analyses of the river waters, and from experiment, the author concludes that the oxidation of the organic matter of sewage takes place, when mixed with unpolluted water and allowed a certain flow, with extreme rapidity. The various methods of artificial purification are discussed; of these filtration through sand is preferred. Under the third category the arguments for and against the use of river water for drinking purposes are examined. It is shown that the death rates of towns supplied by wells and of the supplied by rivers are practically alike, and that in London there is very little to choose as regards mortality between districts supplied with well water and those supplied by river water; and while admitting that, as a matter of sentiment, he would prefer well water, the author contends that there is no reason for supposing that the *materies morbi*, whether it exists as a germ or not, can resist oxidation, which is efficient in destroying other organic matter, as proved by chemical analysis. The author finally submits the two following conclusions—1. That when sewage is discharged into running water, provided the dilution with pure water be sufficient, the whole of it, after the run of a few miles, will be efficiently got rid of; 2. That facts indicate that, whatever may be the actual cause of certain diseases, the *materies morbi* which finds its way into the river is destroyed along with the organic impurity.

April 1st.—H. E. Roscoe, Esq., President, in the chair. The following papers were read:—"On Betorcinol and some of its Derivatives," by Messrs. J. Stenhouse and C. E. Groves. The authors have extracted from *Usnea barbata* an acid provisionally named barbatic acid, which is probably dimethylevernic acid; by distillation it furnishes carbonic acid and betorcinol (or β orcin); betorcinol melts at 163° C., and gives a bright crimson colour with hypochlorites. Its ammoniacal solution is rapidly coloured by exposure to air. Chlorine, bromine, and nitroso compounds were prepared and examined. "Note on Chemical Equilibrium," by Mr. M. M. P. Muir. The object of this paper is to describe a few measurements of the variations caused in chemical changes by modifications in the conditions of these changes, and to attempt to generalise some of the conditions of chemical equilibrium, looking at the phenomena from a dynamical point of view. "Preliminary Note on the Action of the New Diastase Eurotin on Starch, by Mr. R. W. Atkinson. The author has studied in detail the interesting manufacture of "saki," the fermented liquor from rice. He comes to the conclusion that the ferment solution "koji" converts the starch of rice not into maltose and dextrin, but into glucose and dextrin. Analyses of the "mash" are given at various stages, from the first to the twenty-eighth day. "Note on the Products of the Combustion of Coal Gas," by Mr. L. T. Wright. In opposition to the paper recently read before the society by Mr. Ridout, the author concludes that ozone is not formed by the combustion of coal gas, and that the substance which gives the blue colour with iodide of potassium and starch is probably nitrous acid, as when the coal gas and air are carefully freed from ammonia no blue colour is produced. "On Polysulphides of Sodium," by Mr. H. C. Jones. The author establishes the existence of the pentasulphide, which is probably a tetrathiosulphate—this is probably the highest sulphide; on heating it is converted into a tetrasulphide. The precipitate produced by the addition of the pentasulphide to cadmium salts contains cadmium, sulphide, and sulphur. "On the Reflection from Copper and on the Colorimetric Estimation of Copper by means of the Reflection Cuprimeter," by Mr. J. Bayley.

PHOTOGRAPHIC SOCIETY.

March 9th.—J. Glaisher, Esq., President, in the chair.—Papers were read: by the Rev. H. Lansdell, "On a Tour round the World, *viâ* Siberia and California," illustrated by photographs,—and by Capt. Abney, "On the Lateral Spread of the Image during Alkaline Development," showing that a deposit took place in all directions, and thus overlapped the edges, causing blurring.

GEOGRAPHICAL SOCIETY.

March 8th.—Major-General Sir H. C. Rawlinson, V.P., in the chair. The following gentlemen were elected Fellows:—Earl of Charlemont, Captain W. E. Armit, Staff-Commander W. B. Goldsmith, Lieutenant J. Hobday, Messrs. H. C. W. Becher, C. G. Brown, H. A. Hammond, E. H. Man, J. Montefiore, H. J. Moxon, St. John Stephen, A. A. Ludwig Straube, and G. Venables. The papers read were "Latest News from the Society's East African Expedition," and "An Autumn and Winter Voyage along the Coasts of Norway and Lapland," by Lieutenant G. T. Temple.

GEOLOGICAL SOCIETY.

March 24th.—R. Etheridge, Esq., President. in the chair. Messrs. H. T. Burls, J. A. M'Donald, and Rev. T. E. Woodhouse were elected Fellows. The following communication was read:—"On the Newer Pliocene Period in England, Part I. Comprising the Red and Fluvio-Marine Crag and Glacial Formations," by Mr. S. V. Wood, jun.

ARCHÆOLOGICAL INSTITUTE.

April 1st.—C. S. Greaves, Esq., in the chair. Mr. J. B. Davidson read an important paper on the Twelfth and Fifteenth Itinera of Antoninus, in which he ably dealt with the various treatises of his predecessors in the same field, from the industrious studies of the sixteenth century to the papers by Bishop Clifford and Mr. Gordon Hills. With reference to these latest productions, Mr. Davidson noticed that the authors put forward their views regardless of the successes or failures of all previous essayists and of the traditions of the matters at issue, notwithstanding that a consensus had actually been arrived at on the main features involved. He considered the numerous editions of the Iters, both English and foreign, the main object of his paper being to weigh the case fairly as it was considered by the men of old, the entire question being handled with exceeding minuteness and learning. Mr. Davidson dealt with the novel process of reasoning with which Mr. Gordon Hills had departed from the line of existing tradition as regards the Fifteenth Iter, and expressed his surprise that the military road to the south-west of Britain could, with any controlling power, have ended at such a distant post as Dorchester. Mr. Hill's position being based upon accurate measurements to suit the number of Roman miles was further contested by the fact that the abbreviation M.P.M., preceding the numerals, does not mean *millia passuum*, but *millia plus minus*, so that all accurate measurements with rule and compass are out of the question. Mr. Davidson's reading of M.P.M. was certainly supported, as was also his reading of the abbreviation "it'" for *item* instead of *iter*, by ancient and other strong authorities. Mr. Hill's confident use of the longitudes of Ptolemy was also vigorously combated, and the author concluded his paper with a careful survey of the routes of the Iters in question. The chairman spoke in high terms of the labour that had been bestowed upon a most difficult and intricate subject, and, with regard to the, to himself, new rendering of M.P.M., doubted whether the Roman engineers would have measured a route, set up milestones, and recorded on them that the distances were uncertain. The Rev. E. P. Gibson read a paper "On the Parish Registers of Stock and Ramsden-Bellhouse, Essex," giving many curious and interesting extracts concerning collections on briefs, excommunications, fees, affidavits, &c. A discussion followed, in which it was incidentally stated that the long-lost parish registers of St. Alban's Abbey had been lately discovered in a loft. Among the objects exhibited were the following, lent by Mr. Masey, dug up in London Wall:—A remarkable Roman antique bronze, in shape not unlike a shovel, with a ring-handle, possibly part of the trappings of a curricle; Roman sandals of leather, with delicately worked straps; spindle whorls, keys, Samian ware with makers' names, and other Roman remains. Programmes respecting a Special Exhibition in June, at the Rooms of the Institute, of Helmets and Mail were distributed.

ASIATIC SOCIETY.

March 15th.—Sir H. C. Rawlinson, President, in the chair.—Messrs. Robinson and Gibb were elected Resident, Major Trotter, R.E., and Messrs. Massey, Maxwell, Harvey, and Sauvaire, Non-Resident Members.—A paper was read, contributed by Capt. Durand, giving an account of his recent researches in the islands of Bahrein, in the Persian Gulf, where he had found the remains of a vast number of tombs, and possibly of temples, and a remarkable black stone, bearing a very early cuneiform inscription. Sir H. Rawlinson called attention to the great value of these excavations, as throwing additional light on what has been already gained from the interpretation of the legends of Southern Babylonia. The Babylonians, he added, who were mainly instrumental in imparting civilization to Western Asia, admitted having received all their knowledge from the mysterious islanders of the Persian Gulf, agreeably with the tradition preserved by Berosus of Oannes, the Fish-God. The inscription on the black stone he translated, "The Palace of Rimugas, the servant of Mercury, of the tribe of Ogyr."

STATISTICAL SOCIETY.

March 16th.—Sir R. W. Rawson in the chair.—The following papers were read: 'On Vital Statistics of Cavalry Horses," by Dr. T. G. Balfour,—and "A Survey of Indictable and Summary Jurisdiction Offences in England and Wales, from 1857 to 1878," by Prof. Leone Levi.

ENTOMOLOGICAL SOCIETY.

March 3rd.—H. T. Stainton, Esq., V.P., in the chair.—Dr. H. C. Lang and Mr. F. Crosbie were elected Ordinary Members.—Mr. Pascoe exhibited several species of scorpions, in reference to a statement recently made elsewhere that scorpions had been known to sting themselves to death when surrounded by fire. This Mr. Pascoe doubted, and showed that the two common European species, *Scorpio Europæus* and *Buthus occitanus*, were almost physically incapable of effecting such a purpose.—Mr. Stevens exhibited a dwarfed female specimen of *Plebeius Icarus* (*Lycæna Alexis*).—The Rev. A. E. Eaton exhibited several plates of drawings of Ephemeridæ, part of a forthcoming work, and contributed remarks thereon.—The Secretary exhibited, on behalf of Mr. G. Francis, of Adelaide, the microscopical specimens referred to at the last meeting of the Society.—Mr. H. Vaughan exhibited a series of *Cidaria russata* from Yorkshire and the Isle of Arran in illustration of local variation of the species.—The Rev. H. S. Gorham read a further communication on the Lampyridæ, and also a paper giving the results of his observations on these insects with respect to their phosphorescence, which he believed to be due to sexual causes. With regard to the typical species of the family, he observed that in the most highly organised genera, such as Lanprocera and Cladodes, the light-emitting faculty did not appear to be developed in proportion with the rest of the organs, and that the eyes were also reduced "in a direct ratio with the light," being small and uniform in both sexes, "whilst the antennæ were developed in an inverse ratio as the phosphorescence diminished."—Mr. C. M. Wakefield communicated a paper, by Mr. R. W. Fereday, entitled "Description of New Species of the Fam. Lucanidæ and the Genus Chlenius."—The following papers were also communicated: "On Synonyms of Heterocerous Lepidoptera," by Mr. Butler, and "Descriptions of Cetoniidæ and Cerambycedæ from Madagascar," by Mr. Waterhouse.

MATHEMATICAL SOCIETY.

March 11th.—C. W. Merrifield, Esq., President, in the chair.—Mr. W. J. C. Sharp was admitted into the Society, and the following gentlemen were elected members: Prof. Seitz, Messrs. C. S. Peirce, E. M'Clintock, and E. Temperley.—The following communications were made: "Notes on a General Method of Solving Partial Differential Equations of the First Order, with several Dependent Variables," by Mr. Tanner,—"Note on the Integral Solution of $x^2 - 2Py^2 = -Z^2$ or $\pm 2Z^2$ in certain Cases," by Mr. S. Roberts,—and "Notes (1) on a Geometrical Form of Landen's Theorem with regard to a Hyperbolic Arc; (2) on a Class of Closed Ovals, whose Arcs possess the same Property as Two Fagnanian Arcs of an Ellipse," by Mr. J. Griffiths.

PHYSICAL SOCIETY.

March 14th.—Dr. Huggins in the chair.—Prof. Hughes, Prof. Minchin, Messrs. Hulme, Stroh, Wingfield, Macfarlane, and Gray were elected Members.—Mr. W. C. Roberts read a paper "On the Flashing which attends Solidification of Cupelled Buttons of Gold and Silver."—Prof. Barrett described his observation that electricity is generated by the friction of the contact rod or stylus on the chalk cylinder of the Edison telephone, and suggested that this fact explains the true action of the receiver of that telephone, which is usually attributed to electrolysis of the solution in the chalk.—Mr. S. Bidwell made a number of experiments controverting Prof. Barrett's suggestion, and showing that the electricity generated was due to electrolysis.—Dr. Guthrie showed that while flannel rubbed with ebonite is + electrified, and ebonite rubbed with glass is +, flannel rubbed with glass instead of being still more positive is feebly −.—A note was then read in which Mr. Ridout stated that he had succeeded in attracting a cone of glass into the mouth of a funnel through which a stream of water flowed, the angle of the cone being greater than that of the funnel.

NUMISMATIC SOCIETY.

March 18th.—J. Evans, Esq., D.C.L. President, in the chair.—Messrs. G. W. E. Bieber, J. W. Trist, and A. W. Young were elected Members.—The Rev. Canon Pownall exhibited and communicated some notes on the following coins: 1. A base shilling of James I., countermarked as a siege-piece of Kilkenny; 2. A sixpence of Queen Elizabeth, 1564, countermarked with the arms of Zealand; 3. A testoon of Edward VI., countermarked in the reign of Elizabeth with a portcullis before the face of the king, and ordered to pass for fourpence-halfpenny; 4, A penny of Stephen, from the collection of Mr. Young, of Leicester, struck at the Nottingham mint, and countermarked with a cross sufficiently large to deface the king's image, and thus to convert it into money of the Empress Matilda.—Dr. Pauli exhibited a paper coin, 1574, struck from church Bibles during the seige of Leyden; also a large silver medal, struck to commemorate the sitting of the Synod of Dordrecht in 1619, and other coins.—Mr. B. V. Head read the first portion of a paper "On the Chronological Sequence of the Autonomous Coins of Ephesus," in which he brought down the history of Ephesus from the earliest times to the end of the fifth century B.C.

DANGERS OF FIRE FROM STEAM PIPES.

Wm. J. Baldwin, of Elmira, N. Y., writing to the *Scientific American* on the above subject, gives the results of the following experiments, premising that it would be well to define the difference between seasoned wood, charred wood, and charcoal.

The first admits of no degree; it is simply wood with the sap and the excess of moisture, above what would be incidental to the hygrometric state of the atmosphere.

The second admits of degree, and is wood with the hydrocarbons partly driven off, according to the completeness of the charring.

The third admits of no degree, and is nearly pure carbon and ashes.

I enclosed a two inch cube of white pine wood within a small gas pipe retort, with a bit of solder (one-third tin and two-thirds lead) and a bit of sheet lead, and placed the retort in a boiler tube for five days, boiler going day and night. At the end of that time the wood was pure charcoal, the solder was melted, and the lead was not, which goes to show pure charcoal can be made at a temperature between 500° and 612° F.

To prove the above was pure charcoal, *i.e.*, that all the hydrocarbon was driven off, I raised the temperature of the retort to about 1200°, but could not drive off any more gas.

In October, 1877, I enclosed pine laths against the shell of a horizontal boiler, and covered them with a course of brick on edge. The pressure of steam in this boiler has been 40 to 60 lb. day and night since, except one day a month for cleaning. The ends of the laths that came out to the air and flush with the brickwork are not near as dark as hemlock tanned leather, and the darkest part I could find which was entirely covered with brick is not as dark as roasted coffee. This goes to show charcoal cannot be made at 300° F., after two and a half years, under the most favourable circumstances, with a furnace fire only five feet beneath it.

To prove this wood was not charcoal, I placed it in a retort and drove off gas that burned with nearly as much light as illuminating gas, when it leaves the retort.

In experiments on the ignition of charcoal, I found that the charcoal made in the boiler tube would not redden at the melting point of lead (612° F.), but would at a lower temperature than zinc (770° F.).

My mode of operation was this way. I passed a gas pipe through a fire and blew pure air through the pipe. I also prepared myself with long slender strips of solder (half and half, and one-third tin and two-thirds lead), and with strips of lead and zinc, and pine shavings, and small pieces of the laths and charcoal.

The pure charcoal would not redden in the same blast that just melted the lead, but did in a blast which melted it rapidly. When held in a blast which melted solder (one-third tin and two-thirds lead, melting temperature about 500° F.), it showed no signs of fire or redness.

The lath, which was two years and a half in contact with the boiler under a course of brick, would become charcoal in a temperature which melted half and half solder, but would not get a spark on it until I increased the temperature to where the needle of lead bent and dropped. The same with a nicely prepared splinter of white pine, in which I could see no deviation in the action from the splinter of the lath; they all became charred in the blast which melted half and half solder, but would not take on a spark until the lead melted.

With a blast that fused a metal 19 parts tin, 31 lead, and 50 bismuth, melting temperature about 212° F., I could not turn tissue paper brown.

Gunpowder held in the blast which melted the lead did not explode until after the lead melted. It gave off a slight blue sulphurous light first, then the lead melted, and an instant after the powder exploded.

The statement I made in my first letter I now repeat, "that the temperature at which wood and charcoal fire is between 500° and 700° F.," and that the purer the charcoal the higher the temperature required.

Illuminating gas will not take fire from a cherry red poker, but will from a bright red one.

The gas of wood, crude petroleum, soft coal, or any other hydrocarbon, will not take fire when escaping hot from the retort. With a cherry red poker I have tried the three mentioned.

I now wish to say that it was not my intention to make any of the readers of your journal careless in construction, and I would be sorry should my remarks, in answer to Mr. Smith's letter, be the cause of loss to any of them.

I know insurance companies act on the principle that "prevention is better than cure," and that the results in many cases justify their acts few will deny; but questions of fact must be answered yes or no, and not by the *modus vivandi* of the insurance agent.

I will comment on the points in Mr. Atkinson's letter as they occur, and then try to show where the real danger lies in the use of boilers and steam pipes.

Is it not more likely that the wood of the "open boiling keir" was darkened in colour by the oxide of iron from the nails than charred by the temperature of boiling water at atmospheric pressure, conducted through the length of the nails into the wood, and is not this *rusty* appearance often taken for charring?

The "fine charcoal" under some conditions might be classed with damp cotton, slack of soft coal, or lamp black; but while workmen are allowed to carry matches in their vest pockets, it would be safer to associate it with the matches, especially in the face of all the steam pipes that are packed in charcoal, and one in particular in California, where high pressure steam is carried 2600 feet into a mine packed in charcoal.

The steam pipe "through the sill" prepared it for fire by drying it, and the dropping of a match, the fire from a cigar, or the superheating of the steam by getting low water in the boiler, could start it into active combustion. The same remarks will apply to the floor beam.

"Oiled waste cotton or wool and greasy overalls" have taken fire from being locked in a tool chest, *without* the aid of a steam pipe.

I will now endeavour to show why any one, whether insured or not, should comply with the requirements of the underwriters with regard to steam pipes and boilers, especially the latter.

When a journeyman, working in New York city, I was sent to John Hecker's house, in great haste, to see what the matter was with the steam heating apparatus. As soon as I entered the hall door I "smelled a burned boiler," and when I reached the boiler room I saw one. The generator was a sectional pipe boiler, and was red hot, with the pipes badly warped, and the fire still in the furnace. Upon investigation I found that the hair felt and canvas covering was charred through, the latter being as brown and crisp as burned leather for a distance of about fifteen feet, and beyond that, for about fifteen more, it showed signs of charring, lessening with the distance. It surprised me the house did not take fire, for, instead of having steam at a *maximum density* in the pipes, it was at first *superheated* (cause, very little water in the boiler), and as the pressure found vent through the burned boiler (as some of the tubes were burned through), it must have been red hot air or gas which filled the pipes, and nothing but the want of circulation prevented it from carrying the heat to the small uncovered pipes throughout the house.

This is not the only case that came under my notice. The First National Bank of Pittsburg had nearly the same experience when the janitor, in the fall of the year, fired two horizontal multitubular boilers for three hours (8 a.m. till 11 a.m.) before he discovered anything wrong. He then came to look for me, and did not find me till 1 p.m. The boilers were still hot, and the uncovered pipes near the boilers were turned true black, the same as if they had just left the welding furnace and cooled; but where they were covered, the composition did not fall off, it being one of the lime and asbestos mixtures. Another case was a private house in Detroit, where the blow-off cock was opened maliciously, and the Chalmer-Spence covering was charred and destroyed, and had to be replaced on the boiler, and for about six feet beyond it on the main steam pipe.

I cite the above to show there is danger from superheated steampipes, and though the superheating of pipes is not an everyday occurrence, it is safe to say they are more frequent than boiler explosions.

The following, though not generally recognised, often cause fires:—

(1). The sudden closing of a damper on a fresh fire is apt to send flame or sparks through any cracks in the brickwork of a boiler.

(2). A *back draught*. The explosion of carbonic oxide, which sometimes takes place when any one opens the furnace door and admits air, where a lazy fireman has heaped coal on a dirty fire, which partly decomposes the coal by the heat of the fuel already in, but does not produce complete combustion for the want of sufficient air.

(3). The leaving of *banked fires* over night, with doors open or partly open, and dampers shut or partly shut, which, under some conditions, make small explosions of gas or throw hot coals by the bursting of slate in the fire out through the door.

The raking out the remnant of a wood fire at quitting time, which, thought it be ever so well done, is attended with great danger from sparks.

The excessive heat from upright boilers, smoke pipes.

The taking fire of soot, of soft coal, or wood, which will never show itself, or never can assume active combustion, when the fire in the furnace is going, as the carbonic acid gas from one fire will not support a second in the smoke; but should the first fire be low or out, the air will pass rich in oxygen to the second, and redden it, thereby heating the smoke pipe.

MILK AND LIME WATER AS ANTI-DYSPEPTICS.

MILK and lime water are, it appears, now frequently prescribed by physicians in cases of dyspepsia and weakness of the stomach, and in some cases are said to prove very beneficial. Many persons who think good bread and milk a great luxury, frequently hesitate to eat it for the reason that the milk will not digest readily; sourness of stomach will often follow. But experience proves, says the *Journal of Materia Medica*, that lime water and milk are not only food and medicine at an early period of life, but also at a later, when, as in the case of infants, the functions of digestion and assimilation are feeble and easily perverted. A stomach taxed by gluttony, irritated by improper food, inflamed by alcohol, enfeebled by disease, or otherwise unfitted for its duties—as is shown by the various symptoms attendant upon indigestion, dyspepsia, diarrhœa, dysentery, and fever—will resume its work, and do it energetically, on an exclusive diet of bread and milk and lime water. A goblet of cow's milk may have four tablespoonsfuls of lime water added to it with good effect. The way to make lime water is simply to procure a few lumps of unslaked lime, put the lime in a stone jar, and add water until the lime is slaked and of about the consistence of thin cream; the lime settles, leaving the pure and clean lime water on the top.

TALKING MACHINE.

A MACHINE with which a remarkably close imitation of human speech can be produced has (says the *Times*, from which we quote) been brought to this country by the inventor, Herr Faber, and exhibited to the Physical Society and privately, for closer examination of its mechanism, to several well-known scientific men. It opens up an entirely different set of questions from those suggested by the performances of the phonograph, which merely reproduces sounds uttered by the human voice. This talking machine will give intelligible utterance, more or less distant according to the words, to the ideas of the operator. The machine is the product of the continuous labour and study of two members of the same family. It was begun in 1815 by one Joseph Faber, and so far elaborated in 1841 that it was exhibited in that year to the King of Bavaria. The originator, dying, bequeathed the machine to his nephew, the present owner, also named Joseph Faber, who had been associated with him in its construction, and since it became his property Herr Faber has almost doubled its powers of articulation. The chief points of interest the machine has for the physicist, the physiologist, and, it may be added, for the philologist, lie in the results obtained from the ingenious contrivances by which the functions of the flexible and mobile organs of voice are performed. The principle features of the machine are, to begin with, the bellows, from which the air is driven with considerable but varying force by means of a pedal lever. The lever passes in an horizontal stream through a small chamber, which represents the human larynx, and in the same right line out through the mouth. The lips and tongue are of india-rubber, and the lower jaw is movable.

Below the laryngeal apparatus, and opening from the chamber in which it is contained, is another smaller chamber, about the size and shape of a lemon, from which a pipe curved upwards allows the air when driven through to escape. This supplies the place of the nose to the instrument, and when a valve is opened enables the sound of the letters m and n to be produced by the striking of the same keys with which the sounds of b or p are obtained. The larynx is, of course, the most complex part of the machine, and to Herr Faber is due the elaboration of this portion of the mechanism. Within a small oblong box a narrow and exceedingly thin strap of hippopotamus bone, strengthened by india-rubber on one side, produces by its vibrations the speaking tone, which may be called the fundamental sound to be subsequently modified. At the will of the operator the pitch can be raised or lowered, but not during the utterance of a word or sentence, so that in saying "Mariana," or "*Comment vous portez vous?*" the machine talks French, German, Italian, or English) the key-note remains unaltered to the end. In front of the vocal chord, and within the laryngeal chamber, are stops or diaphragms, placed vertically, and rising and falling like the wards of a Chubb's lock, but different in that each stop is a complex machine in itself, having within, moved by a spring, another stop by means of which an orifice at the base is enlarged or diminished. Herr Faber has taken another liberty with nature, for besides placing the nose below the mouth, for the sake of convenience, he has placed the teeth in the larynx, or more strictly speaking, with one of these stops he gets a somewhat lisping "s" or the sound of "sh" from the machine. A small wind-mill like arrangement gives the rattle of the letter "r," and a thin iron band, notched in the lower rim in front, fitting outside the upper lip, descends to give the "f" or "v" sound. There are 14 keys by which sounds are controlled. Striking the first the sound of "a" in "father" is produced, the mouth remaining wide open; another key being struck the lower jaw rises and the sound of "o" in "bowl" is given a third key moves a lever which nearly closes the mouth, and the sound of "o" in movement is emitted. The other vowel sounds, and the consonants are produced by the use of the diaphragms, in the larynx with the mouth in the second or third positions.

RECENT AMERICAN AND FOREIGN PATENTS.

Mr. William Freeland, of Brooklyn, N.Y., has patented a simple, durable, and safe device for securing carriage traces to the whiffle-tree, especially adapted to light harness having slotted leather traces, and it consists in a slotted pin fitted with a spring blocking piece, which is normally projected by the spring to retain the trace, and when depressed closes within the pin and flush with its surface.

Mr. Enoch B. Norton, of Hartford, N.Y., has invented an apparatus for sprinkling Paris green liquid on plants attacked by in sects, the object whereof is to enable the liquid to be carried conveniently in a suitable vessel, and to permit the quantity of liquid delivered and the direction in which it is sprinkled to be promptly regulated by the operator.

Mr. Richard Young, of Brooklyn, N.Y., has invented a tool for ornamenting and finishing the surface of leather, which consists in a creaser or marker, such as is used for lining, and a roller for embossing and printing, the creaser being stationary, while the roller is fitted to revolve, so that in use a line or crease and a printed impression are produced at the same time. The tool is used in connection with a drum, hand jigger, or other machine of usual character for finishing leather.

A lamp base, made of glass or porcelain, provided with two rings adapted to fit on the body of the base, and having two handles, each of which is attached to both of the rings, has been patented by Mr. Joseph Kintz, of West Meriden, Conn.

Mr. John F. Curtice, of Fort Wayne, Ind., has patented an improved device for heating sad irons upon the top of a stove. The invention consists in an improved sad iron heater formed of an open bottomed box divided into compartments by vertical partitions, having the middle part of its top stationary and provided with a handle, and the side parts of its top inclined and formed of doors shutting air tight, or nearly so, and provided with spring catches, to adapt the device for use in heating sad irons upon the top of an ordinary stove.

An improved road-scraper, patented by Mr. Samuel H. Dudley, of Bantam Falls, Conn., consists in the combination of guard bars having their upper ends bent forward at right angles to fit into the notches in the upper edge of the plank, and having sockets formed in their lower parts to receive the rear ends of the draw rods, with the plank, the draw rods and the staples of a scraper.

Mr. Charles A. Gale, of Piqua, Ohio, has patented an improved apparatus for taking solar prints from negatives. The invention consists in the combination of the two frames, hinged to each other at one edge, and provided at the other edge with a bolt and hand nut or equivalent clamp.

Messrs. Cornelius Bennett and Parker Burnham, of Silver City, Territory of New Mexico, have patented an improved apparatus for separating gold and other metals from dirt and sediment by what is known as the "dry" process. The invention consists in a combination of devices which cannot be explained without engravings.

Mr. Nikolaus Kaiser, of Grellingen, Switzerland, has patented an improved mode of drying paper and pasteboard in continuous strips, and in the apparatus employed for that purpose. Heretofore the paper coming from the pressing machine, or other machines, was led over heated metal cylinders, which had the disadvantage that the paper became more or less brittle, thus rendering impossible the use of mechanically ground unboiled wood fibre without other admixture, and also that the cost of plant and working was considerably increased by the necessary employment and working of the expensive metal cylinders required for the purpose. This invention is designed to obviate these defects.

Mr. Frank H. Lauten, of New York city, has patented improvements in feeding paper and other material to printing presses and folding machines, the blanks to the forming and shaping machine for making paper boxes and bags, ruling machines, and for other similar machines wherein the paper or other material requires to be fed in single sheets continuously and in harmony with the operative mechanism of the machine. The improvements also comprehend devices for adjusting the paper on the apron.

An improved machine for cutting the corners of books, cards, and paper has been patented by Mr. William T. Pringle, of New York city. It is of very simple construction and well calculated for the work it is intended to perform.

Mr. Henry L. Russell, of Bloomington, Ill., has invented an indicator lock especially designed for fire alarm boxes, railroad switches, &c., where it may sometimes be desirable to know who unlocked it last, that must be opened with numbered keys, and will register the number of the key that last unlocked it.

Messrs. Richard H. Briggs and James H. Dougherty, of Whistler, Ala., have patented improved mechanism for making ladder irons and hand-holds for freight cars. The machine consists of an ingenious combination of devices which cannot be clearly described without engravings.

An improved cider press, patented by Mr. Gottlieb Ziegler, of Paris, Ohio, will press the juice from any quantity of pomace that may be required without changing the parts of the press. It is also adapted to work more rapidly than the presses now in use.

An improved gate hinge is patented by Mr. James E. Davis, of Palmyra, Ohio. This hinge is designed for the class of gates that are opened by running them back and then swinging them around. It consists in a gate hinge formed of a screw hinged to a pintle provided with a small pulley and placed within a large ring pulley.

Mr. Garritt M. Van Riper, of Bodie, Cal., has patented an improved band sawing machine for cross cutting. The invention consists in a band saw working on pulleys that are fitted movably on vertical shafts, whereby the saw can be moved downward to cut from a log two blocks at once.

An improved paper pulp screen, patented by Mr. Benjamin F. Warren, of Cumberland Mills, Maine, is designed to pulsate the pulp in a simple and effective manner, and it may be adjusted to vary the pulsations as required.

An improved turbine water wheel has been patented by Mr. William B. Farrar, of Greensborough, N. C. This invention has for its object to provide an improved turbine water wheel which shall be simple and inexpensive in construction, but strong, durable, and capable of running at comparatively high speed with moderate pressure or comparatively low head of water.

Messrs. David H. and Jerome H. Payne, of Troy, N. Y., have patented an improved pulley for suspending clothes line. The line with clothes hanging upon it can be easily pulled around without injury to the clothes.

Mr. James J. Dubois, of Springtown, N.Y., has patented an improvement in wagon running gear, the object of which is to furnish wagon reaches constructed so that they may be screwed into the rear axle and the head block, and may be guarded from being worn by the forward wheels in cramping the wagon.

Mr. William Huey, of Cambridge, Md., has patented a machine for cutting blanks from a block of wood and simultaneously grooving it preparatory to bending it into form for making the rectangular sides of the box. The invention consists in the arrangement of a stationary horizontal knife bolted strongly to a bed frame, so that it cannot bend when under strain; an adjustable gauge plate with groove cutters arranged just in front of the knife and enough below its edge to give the proper thickness of blank, together with a reciprocating block carrier.

Mr. James A. Knetzer, Sr., of Fillmore, Ind., has patented an improvement in the class of wagon brakes in which the sliding brake bar is adjusted by a rock shaft hung on the rear axle, and having on inner end an arm from which a rod extends forward to the brake bar. The improvement pertains to the construction of the lever which operates the rock shaft, and the construction and arrangement of the device which connects them.

A firm and easily applied device for fastening handles to axes and other tools, has been patented by Mr. Andy E. Tangen, of Bismarck, Dakota Ter. It consists in fastening the handle in the eye of the axe or tool by means of spring straps adapted to clasp the ends of the handle inserted in the eye, and a bolt inserted into the eye from the end opposite the handle, so as to engage the spring traps.

Mr. John Houck, of Tobyhanna Mills, Pa., has patented improvements in feeding mechanism for tubular cutter-heads used for turning broom handles, curtain rollers, umbrella handles, and other wooden articles of cylindrical form. Such machines have heretofore been fitted with feed rollers fixed at the front and back of the hollow mandrel to carry the sticks through, and in case of the sticks breaking, or when for any reason access was required to the mandrel, considerable time and labour were involved, as the rollers or the mandrel had to be removed from their bearings. The object of this invention is to fit the feed rollers so that access may be had to the cutter readily without disconnection of the parts.

A combined rule, square, and gauge for carpenter's use in framing, has been patented by Mr. Mahlon B. Cornell, of Philadelphia, Pa. The object of the invention is to furnish an implement adapted for carrying out all the purposes for which the ordinary square is used with greater facility, convenience, and accuracy.

Mr. Lucius S. Edleblute, of Cincinnatti, O., has patented an improvement, in the class of metal wheel hubs in which the spoke tenons or butts are clamped between flanged collars, one of which is adjustable on the axle box to adapt it for convenient adjustment or removal. By the peculiar construction and arrangement of parts the inventor forms a very firm, strong, and durable hub, whose parts may be readily put together or taken apart, and which is adapted to carry a comparatively large supply of lubricant.

An improved vehicle axe, patented by Mr. James Conniff. of Oconto, Wis., consists of an axle made of cast iron in a cylindrical form, and divided off at each end into compartments, in which are placed rollers in a circle, so as to form a bearing for the spindles which are inserted in the ends of the axle. The spindles are held in the axle by collars, which rest in one of the compartments between balls, which hold them steadily and prevent endwise motion without producing much friction.

Mr. Jacob Mollet, of Liberty, Mo., has patented an improved vise for holding saws while being filled, which is simple, convenient, and and so constructed that the whole of one side of a saw can be filled without moving the saw. It may be used for holding hand saws, crosscut saws, and circular saws with equal facility.

Mr. Alexander B. Campbell of Albion, Wis., has patented an improved harrow coupling, which forms a flexible connection between the several harrow bars. It consists in a harrow coupling formed of a clevis attached to a harrow bar, the upper shank of which clevis is lengthened and terminates in an eye, into which a bar hook attached to the forward part of the clevis of the following harrow bar passes.

An improved drilling machine has been patented by Messrs. Nicholas Remmel and Mathias Remmel, of Rewaskum, Wis., for operating drills for drilling holes in metal and also for holding augur bits and other tools for boring wood. It consists in a drill stock connected with a shaft rotated by a crank or band wheel and gearing and held in a stationary frame, and in a device for feeding the work to the drill by means of a table placed on a shaft held in vertical guides and connected by levers with a treadle.

Mr. Elias A. Wible, of Folsom, Cal., has patented an improved vehicle axle formed of a socketed tube and a wooden stick, in combination with an interposed layer of rubber. There is a hole leading through the axle to the shaft, and provided with a case, a cup, and a screw, for the purpose of lubrication.

Mr. Gustave Wedel, of San Francisco, Cal. has patented an improvement in the class of binders for folios, or a series of detached leaves; it consists of metal strips doubled longitudinally to form lips or clamping edges, between which the leaves are secured.

Mr. John Kenmuir, of St. Joseph, Mo., has invented an improved twelve bells striker for clocks, the object of which is to furnish a clock for use in masonic lodges, which shall be so constructed that it may be made to strike twelve low bells whenever desired, which will strike at no other time.

Mr. William W. Mackey, of Galion, O., has patented an adjustable gauge for cutting bevels for mitre joints with a circular saw, and for cutting them on opposite ends of the moulding without changing the gauge. It consists of two gauges pivoted at one end to the sliding bed on the side next to the saw, and having the opposite ends pivoted to levers or arms having longitudinal slots, which are crossed and secured together and to the bed by a set screw passed through the slots at the junction. These arms are designed to be graduated so as to permit the gauges to be set readily at any desired angle to the saw.

Mr. Richard Cotter, of Virginia City, Nev., has patented a machine for tarring flat and round wire ropes, which is so constructed as to coat the ropes thoroughly with tar, force the tar into the crevices of the ropes, remove the surplus tar, and prevent it from running down the ropes.

Mr. Warren H. Guthrie, of Florence, N. J., has patented an improved screwdriver having a jaw on each side of the blade, the two jaws being connected by a right and left thumbscrew passed through a slot in the blade, whereby the ends of the jaws can be moved to and from the blade, and thus adapted to clasp screw heads of various sizes.

Messrs. William F. Flanagin and Daniel A. Sager, of Pine Wood, Tenn., have patented an improved automatic let-off mechanism for looms, for letting off the yarn from the yarn beam at a uniform speed from the first to the last end of the warp, the speed of the yarn beam being increased in proportion to the decrease of the yarn on the beam.

Mr. Ansel T. Green, of Minneapolis, Minn., has patented an improved belt stretcher. It consists in fixing gear wheels on the heads of the two long side screws of the stretcher, and in arranging two corresponding pinions on a crank rod in such a manner that when the pinions are thrown in gear with the gear wheels both screws will be worked simultaneously; and it further consists of a graduated clamp for the more accurate adjustment of the sides of the belt, of hinged screw sockets for the quicker attachment and removal of the stretcher, and of a thumbscrew nut of novel construction.

Messrs. Jabez C. Terry and Herbert J. Terry, of Springfield, Mass., have patented an improved button lathe designed for turning buttons into finished shape from blanks previously prepared; and instead of operating upon the principle of a cutter formed to suit the pattern of button, it employs a single cutting tool, which, by a variety of adjustments, that may be effected either by hand or automatically, permits the button to be turned and finished according to any desired pattern.

The same inventors have also patented an rrangement of revolving gripes for holding he stock, which are held normally together y spring pressure, but have a treadle connection for separating or retracting them, and a cutter head revolving in a plane at right angles to the plane of revolution of the gripes, or parallel with the axis of the latter, which cutter head is combined also with a treadle connection for causing the cutter head to approach the axis of the gripes at the will of the operator.

Mr. Elijah Ware, of Omaha, Neb., has patented an improved spring power for watches and clocks. The object of this invention is to construct a spring power mechanical movement for use in watches and clocks, or for other purposes, where a small power is required, and to dispense with the train of gearing usually required. The inventor makes use of a spring attached to and coiled around a shaft that carries a loose and fast gear wheel, the spring being attached also to the loose gear, and the two wheels geared to a secondary shaft.

Mr. James A. Moore, of Kewanna, Ind., has invented a spring-propelled carriage, whose motive power is contained in a combination of coiled springs, levers, eccentrics, &c. These are so arranged upon a carriage as to be capable of exerting sufficient force after the springs are wound up to effect a long continued and economical propulsion of the carriage.

Improvements in pressing machines for printers, bookbinders, &c., have been patented by Mr. Joshua W. Jones, of Harrisburg. Ta. The object of this invention is to improve the construction of the machines for which letters patent Nos. 204,741 and 212,947 were granted to the same inventor June 11, 1878, and March 4, 1879, respectively, and which were illustrated in these columns some time since.

Mr. Ebenezer R. Gay, of Dubuque, Iowa, has patented a relishing or tenon finishing machine for use on rails for doors, blinds, panels, or other woodwork having rails with tenons and a groove or rabbet for panels. In such work, when the groove is not as wide as tenon is thick, or does not have the same face as the tenon, a rib or projection is left, which has to be removed, and the improved machine is adapted for such operation.

Mr. William Forshaw, of Chicago, Ill., has patented an improved platform for vehicles. The invention consists of a forked standard, whose lower end embraces the axle at its centre, while its head supports the bolster plate; and secured between the forks of the standard and projecting laterally therefrom in both directions, is a plate spring parallel with and above the axle, and connected at its ends with the axle by transverse elliptical springs that are secured to the axle near its shoulders; and it further consists of a device for supporting and a device for adjusting the elevation of the carriage pole.

Mr. Josephus T. Willis, of Mount Sterling, Ala., has patented a device for instantly detaching horses from vehicles. It consists of levers, sleeves, pivoted trace hooks, and a helical spring arranged upon a whiffletree and operated by pulling upon the governing strap.

An improved book holder, patented by Mr. John L. Highbarger, of Sharpsburg, Md., is designed for holding books open for convenience of reading. The device is applied to the upper end of a book cover; and it consists mainly of three parts—a bar or roller, two hooks or clasps, and two bent pivoted fingers. The hooks and fingers are attached to the ends of the bar or roller and receive and tightly clamp the upper edges of the lids of the book, and are so attached to the bar that it is free to rotate. The pivoted fingers rotate with the roller, so that they may be turned into suitable position to enable them to hold the leaves of the book.

Mr. William Driscoll, of Brockville, Ontario, Canada, has patented a trap, which is an improvement upon the form of animal trap in which the weight of the animal is made to release the tilting platform and allow the animal to be precipitated into a tank of water, a barrel, or other receptacle placed beneath the trap. In this form of trap it has been a desideratum to secure a latch mechanism for locking the platform which is sufficiently sensitive to be tripped by small animals, like mice, as well as by rats or larger animals. This improvement aims at this result.

Mr. Henry L. Russell, of Bloomington, Ill., has invented an improved device for attachment to the leaders that conduct the rain water from the eavestroughs to the cisterns. It is so constructed as to adjust itself automatically to conduct the first water from the roof into the waste pipe and the succeeding water into the cistern, to prevent the coal dust and other dust that may settle upon the roof from being washed into the cistern.

A bucket for taking bees from the hives to arrange comb, for carrying them from one place to another, and for capturing bees in case of swarming on trees, has been patented by Gideon C. Finley and Sarah E. Finley, of Petersburg, Tenn. The invention consists in a bucket for transporting and capturing bees, having openings for the entrance and exit of the bees, an apron before the entrance slide, and openings for ventilation. The bucket is so arranged that it can be pulled to the top of a long pole if desired.

A key-board attachment for musical instruments, patented by Mr. Christopher C. Reynolds, of Kelseyville, Cal., is to be used in connection with prepared music sheets to play the instrument by turning a crank, or by attachment to any suitable motor.

Mr. James M. Thayer, of Randolph, Mass. has patented a cheap, simple, convenient, and effective buckle for ties for bags. The invention consists of a rectangular frame of metal, perforated on one side for attachment to a strap, the frame having pivoted within it a tongue with a bevelled serrated tip, and curved or rounded end bars for the strap to hold or engage against.

Messrs. Robinson Buckingham and Charles W. Poindexter, of Alto Pass, Ill,, have patented an improved packer, designed to facilitate the pressing into boxes or packages of fruits and vegetables—as, for instance, peaches, early apples, pears, plums, or other fruit that will stand pressure when packed, or green peas, string beans, sweet and Irish potatoes, tomatoes, and other vegetables. The machine used for that purpose presses the fruit or vegetables by the lid into the box or package, and admits the convenient and quick nailing of the lid while being held on the box.

Mr. William C. Beattie, of Taunton, Mass., has patented improvements in jewel cases and analogous articles; it consists in a stand or case, having a stationary bottom portion, a stationary and elevated top or cover, and two standards connecting the said top and bottom portion and forming a handle, in combination with one or more receptacles hinged upon the standards and folding horizontally between the stationary top and bottom portions.

A new key ring, which can be easily opened and locked securely, has been patented by Mr. Bryant H. Melendy, of Battle Creek, Mich, The invention consists of a flat ring, a part of which is straight and provided with a cut, thus forming two ends and permitting the ring to be bent sidewise for admitting the keys. One of the ends of the ring is provided with a small shoulder, and a clasp is pivoted to the other end, which clasp swings over the end with the shoulder and locks it.

An improvement in automatic car couplings has been patented by Mr. Orlo H. Drinkwater, of Cedar Point, Kan. It consists in a peculiar construction and arrangement of parts which cannot be clearly described without engravings.

THE INVENTORS' INSTITUTE,

ESTABLISHED 1st MAY, 1862.

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To aid in Selling and Licensing Patented Inventions.
To furnish advice and professional Assistance in developing Inventions.
To collect Evidence, arrange Arbitrations, and otherwise assi Inventors in maintaining their rights.

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